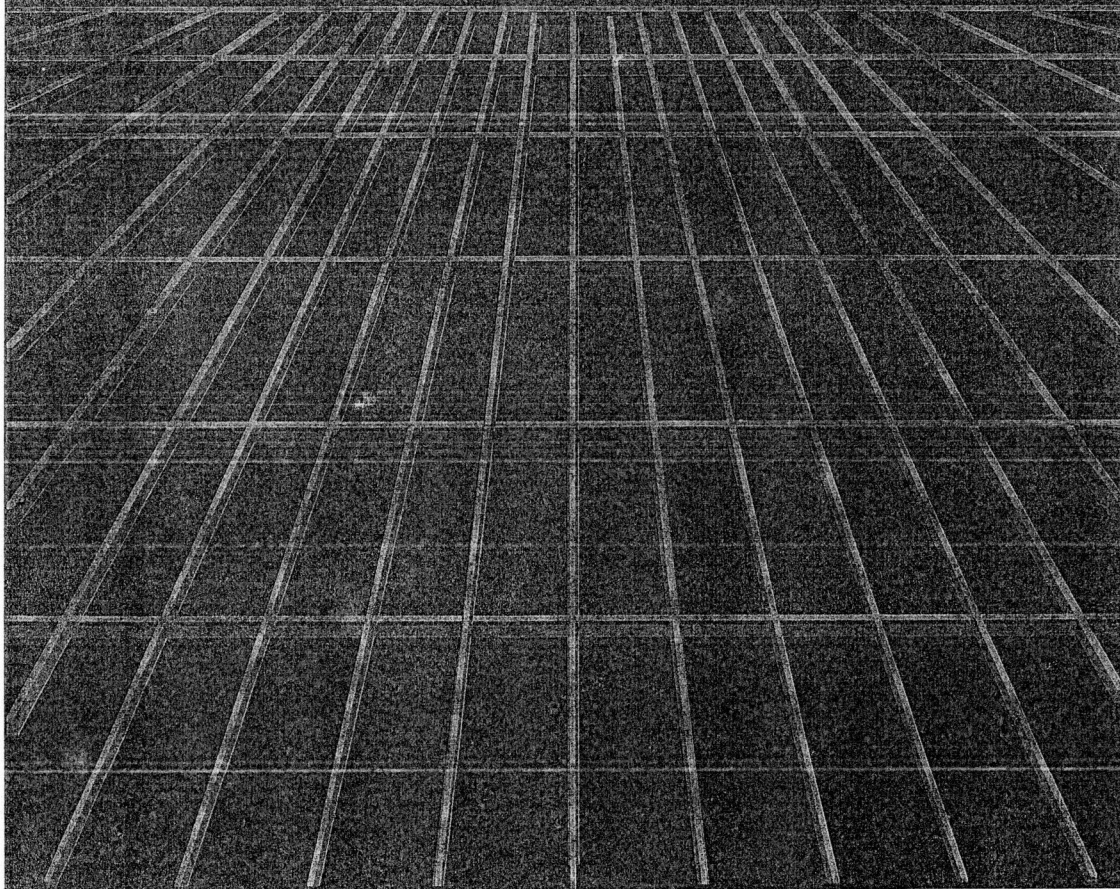


Network Alternate Route Selection

NORTTEL
NORTHERN TELECOM



NETWORK ALTERNATE ROUTE SELECTION

COURSE 321

PUBLICATION HISTORY

NOVEMBER 1995

This is the first up-issue of this guide including release 19 information.

MARCH 1996

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ABOUT THIS COURSE

This course is designed for support personnel who will be responsible for provisioning, maintaining, interpreting, and revising a Network Alternate Route Selection (NARS) data base. The NARS feature allows outgoing calls to be automatically routed over the most cost-effective trunk facility available at the time of the call.

This course provides the student with:

- An overview of the Meridian 1 NARS feature descriptions, operations and applications.
- Instruction on the steps required to provision the Meridian 1 NARS features.
- Interpretation exercises to reinforce the information presented in all course modules.
- Practical exercises in which students will perform specific feature administration tasks.
- A practical exercise in which the student will provision Meridian 1 ESN Node data base to satisfy a specific customer's needs.

With few exceptions, features are addressed in the order in which they are encountered during call processing. The exceptions have been made for the purpose of additionally clarifying other associated features. All features are addressed in full detail in modules devoted to them.

Given the Student Workbook, the Student Guide, the classroom switch, and class notes, the student should be able to generate, modify, retrieve, and interpret a Meridian 1 ESN Node database.

GRADING METHODS

PRACTICE EXERCISES

Practice exercises are utilized throughout this course as learning activities. Your participation in the exercises will be noted by the instructor as either satisfactory or unsatisfactory.

PURPOSE OF STUDENT GUIDE

The purpose of the Student Guide is to provide the student with information required to provision, maintain, interpret, and revise a Meridian 1 ESN Node database.

PURPOSE OF STUDENT WORKBOOKS

The purpose of the Student Workbooks is to provide the student with interpretation and provisioning exercises. The exercises will assist the student in achieving the Student Guide objectives.

PURPOSE OF QUICK REFERENCE CARDS (QRC)

The purpose of the Quick Reference Cards is to provide the student with the prompts and appropriate responses required to provision the NARS features.

AGENDA

Day 1

Describing Trunk Types and Dialing Requirements
NARS Overview
Describing the NARS Access Codes
Describing Uniform Dialing Plan
Describing Network Translation

Day 2

Describing Supplemental Digit Restriction
Describing Supplemental Digit Recognition
Describing Off-Net Number Recognition
Describing Incoming Trunk Group Exclusion

Day 3

Describing Automatic On-Net to Off-Net Overflow
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Describing Digit Manipulation
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Day 5

Describing Network Class of Service
Describing Routing Control

AGENDA, (CONT'D.)

Day 6

Describing Off-Hook Queuing
Provisioning Off-Hook Queuing

Day 7

Describing Call Back Queuing
Describing Network Authorization Codes

Day 8

Describing Network Signaling
Describing Network Transfer and Satellite Link Control
Describing Off-Hook Queuing in an ESN

Day 9

Describing Coordinated Call Back Queuing
Describing Call Back Queuing to Conventional Main
NARS/BARS Interactions with non-NARS/BARS Features

Day 10

Describing Coordinated Dialing Plan
Call Tracing
Describing Network Traffic
Final Practical Exercise

MODULE 1

**DESCRIBING TRUNK TYPES &
DIALING REQUIREMENTS**

MODULE 1

OBJECTIVES

This module describes the various types of trunks that may be used with NARS software and the dialing requirements of each type.

Given the Student Guide and class notes, the student should be able to:

- List and define the various trunk types that may be used with NARS.
- Identify the components of a standard telephone number.
- Identify typical formats for NPA, NXX, and calls to special numbers (SPN).
- Identify dialing requirements for FEX, WATS, OCC, COT and TIE trunks.

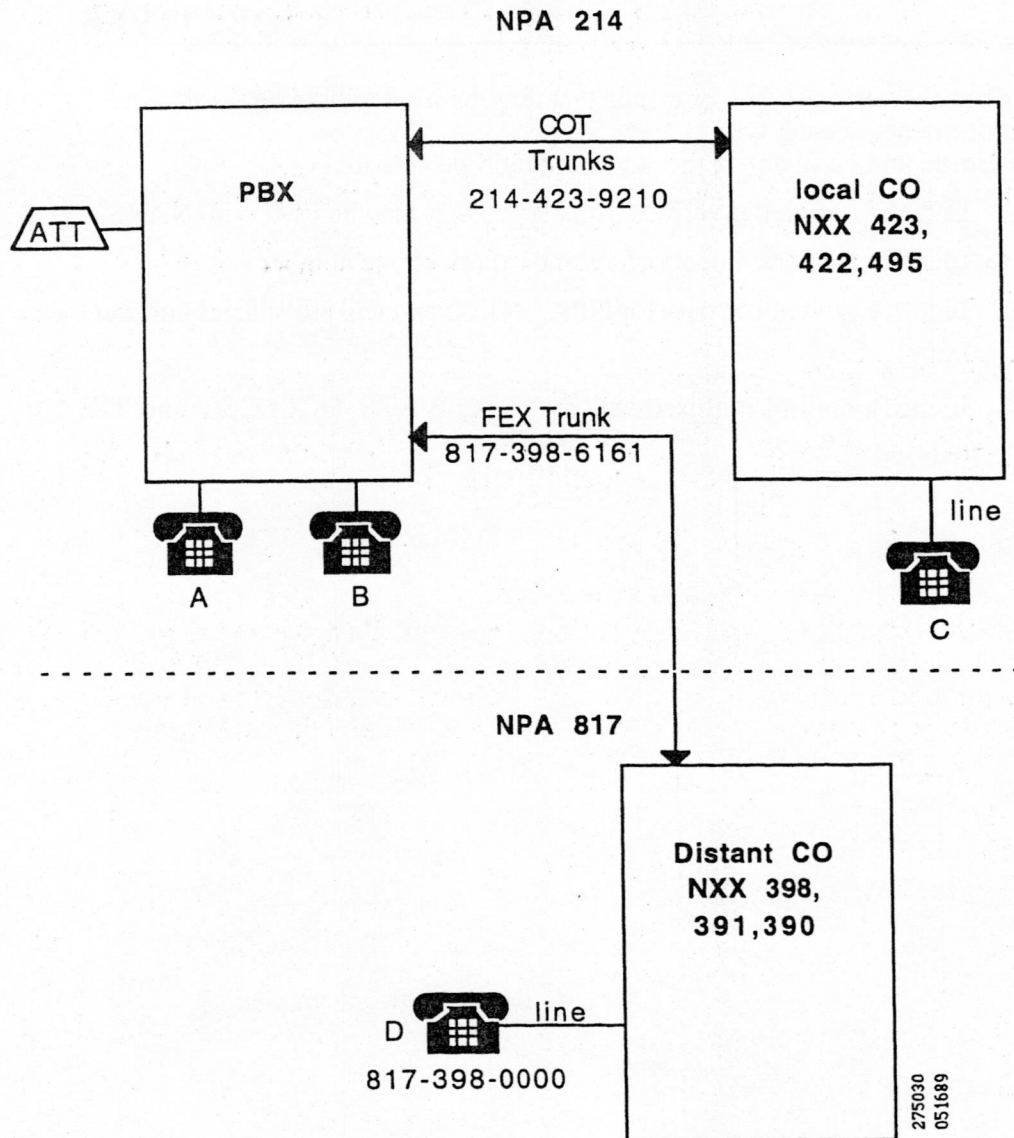


Figure 1

NARS DEFINITION

NARS allows outgoing calls to be automatically routed over the most cost-effective facility available at the time of the call when properly programmed.

TRUNK VS. LINE

A trunk is a single circuit between two points, both of which are switching centers or individual distribution points.

A line is a single circuit between two points, one of which is the switching center and the other is the end user.

TRUNK DIFFERENCES

Different trunks have different functions. It is important to understand how each trunk type functions in order to know which trunks are appropriate for a given call.

CENTRAL OFFICE TRUNKS (COT)

COTs provide unlimited access to the world. A station user may call anywhere using a COT, unless: (a) restrictions are defined in the database of the user's PBX; (b) the facility has been restricted by the serving telco in response to a specific request; or (c) in an equal access CO, no primary interexchange carrier (PIC) has been selected by the customer. COTs may be incoming only, outgoing only, or two-way.

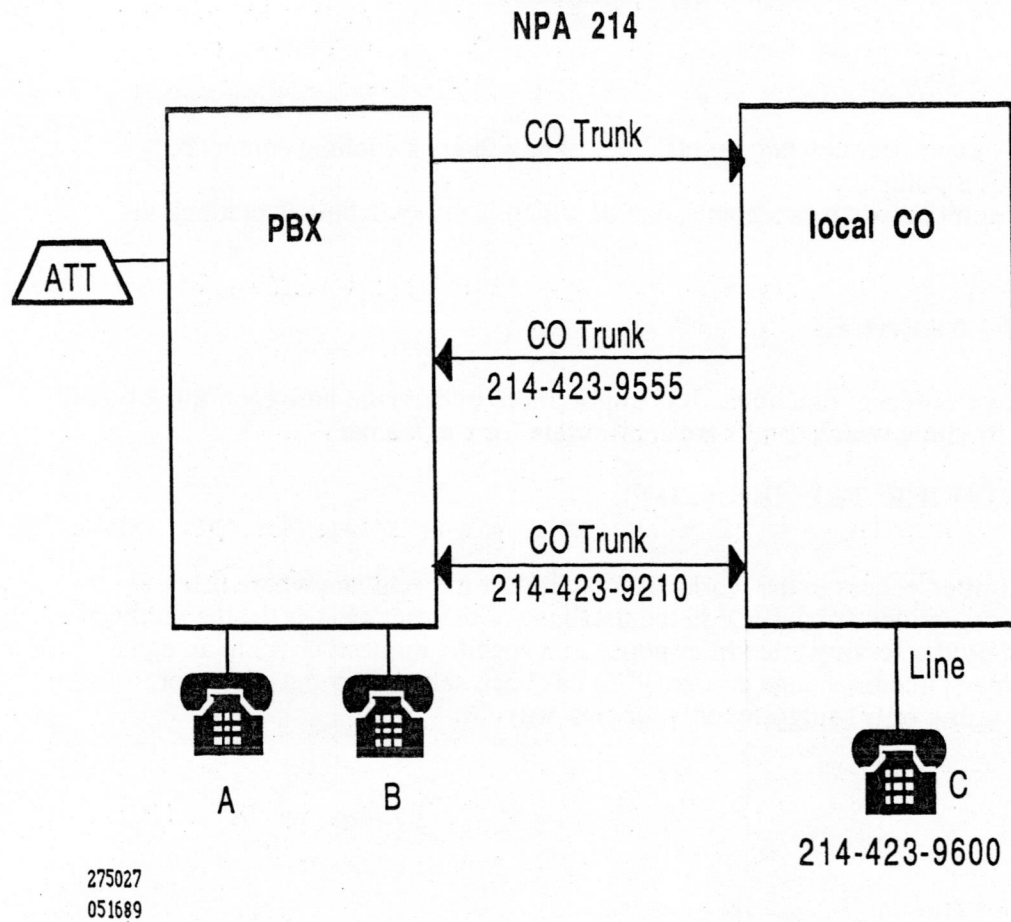


Figure 2

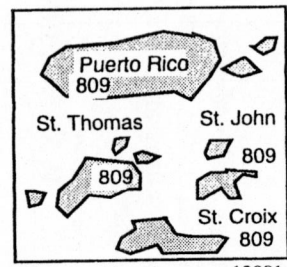
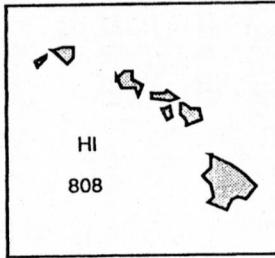
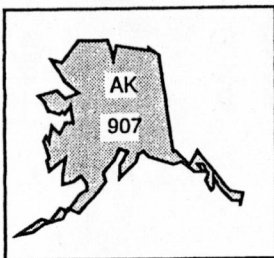
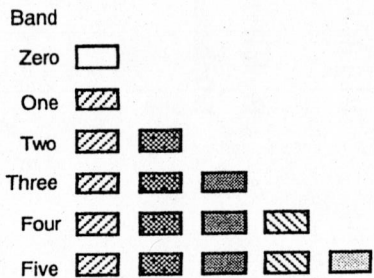
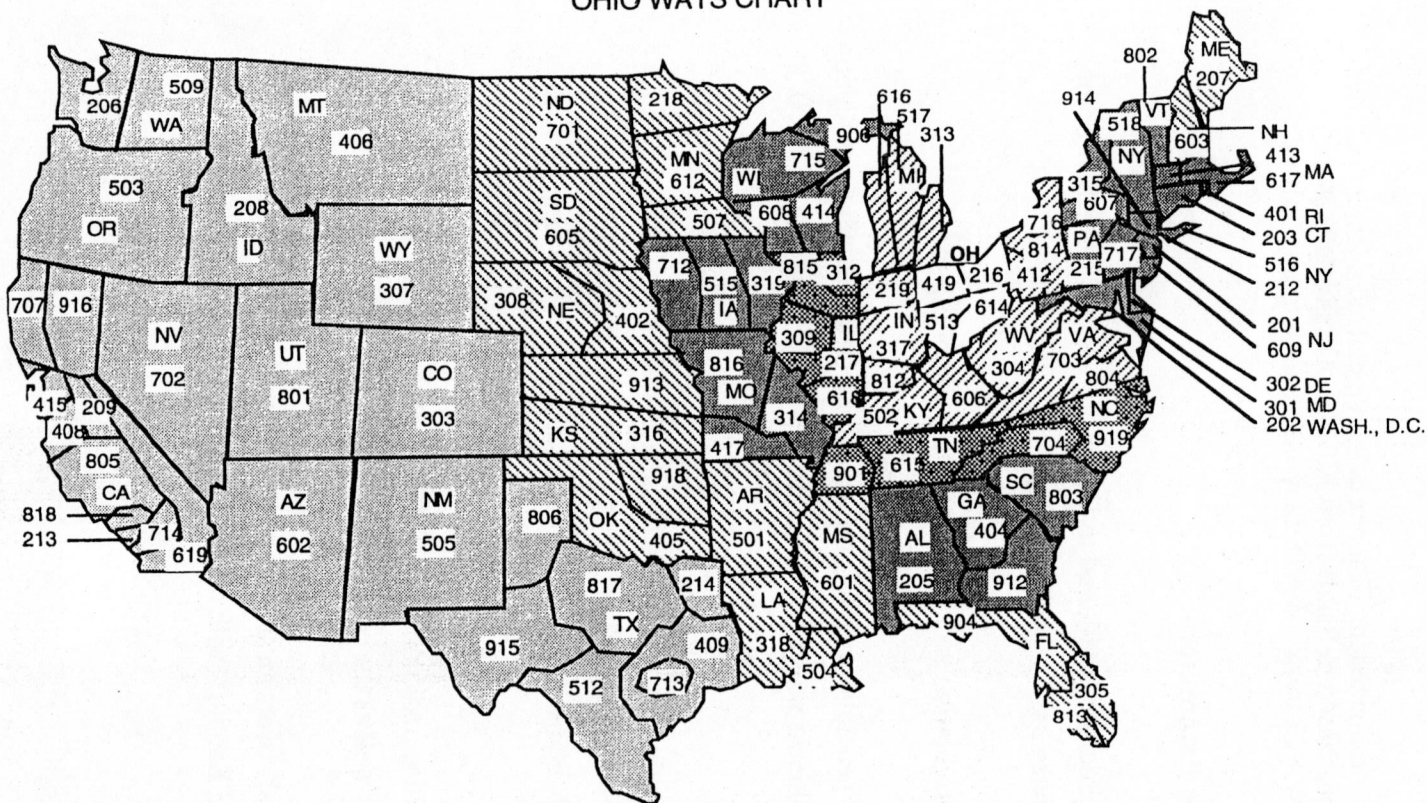
WIDE AREA TELECOMMUNICATIONS SERVICE (WATS)

WATS trunks enable a customer to make long distance calls typically at a lower cost than COTs. WATS trunks can be purchased in Bands from AT&T. A Band defines the geographical calling area of a WATS trunk. WATS may be either outgoing only or incoming only.

WATS Bands Parameters

- WATS trunks are configured in Bands numbered 0 through 9 in the United States.
- Band configuration is dependant upon point of origin.
- Band 0 is generally used for intrastate long distance calls. (Exceptions include: Illinois uses Band 9; California uses 3 intrastate Bands 0, 8, and 9).
- Band 8 is typically used for intrastate, intra-lata service.
- Bands 1-5 are used for interstate long distance calls within the United States.
- Band 5 covers Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands as well as the continental United States.
- Each Band covers an area including the calling area of the lower numbered Band(s) (with the exception of intrastate Bands).

OHIO WATS CHART



120014
061289

Figure 3

VIRTUAL BANDING ACCESS (WATS TYPE VIA CENTRAL OFFICE-TYPE)

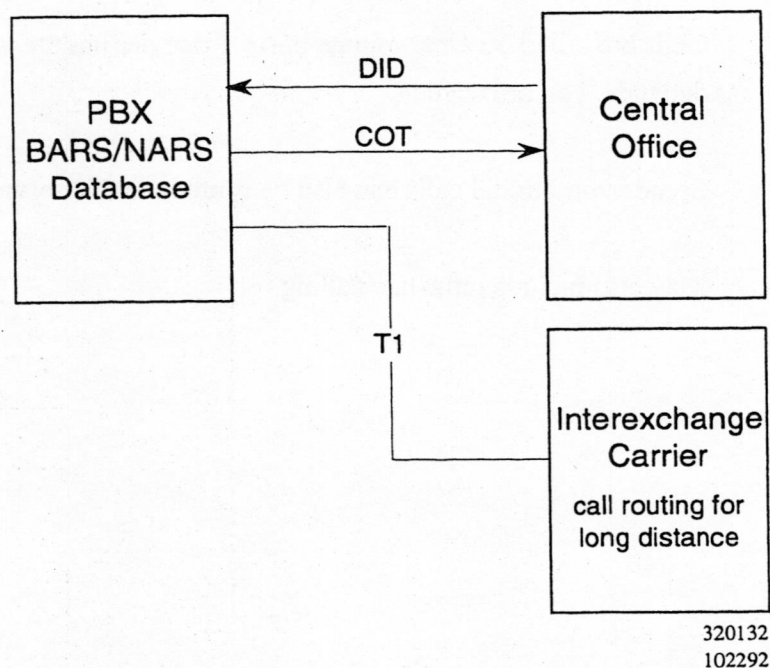
WATS type calls can also be made via Central Office-Type trunks.

- Each vendor uses a different name when referring to this service (i.e.; MCI uses Prism; AT&T uses Pro-America).
- Company subscribes to service and pays a monthly charge.
- Calls are billed on a per minute basis. Price per minute varies depending on area called.
- Some international calls can also be routed via this service.
- May also include intrastate calling.

DIRECT CONNECT TO INTEREXCHANGE CARRIER

In some sections of the country, customers are using dedicated T1 facilities to their Interexchange Carrier (IEC) to provide call routing for long distance services.

The customer is provided DID service from their local Central Office and COTs for placing local calls.



FOREIGN EXCHANGE (FEX)

FEX trunks connect a PBX to a telco central office other than the one that normally serves the PBX's area. FEXs may be incoming only, outgoing only or two-way. FEXs may be used to call anywhere in the world, unless: (a) restrictions are defined in the database of the user's PBX; (b) the facility has been restricted by the serving CO in response to a specific request; or (c) in an equal access CO, no primary interexchange carrier (PIC) has been selected by the customer.

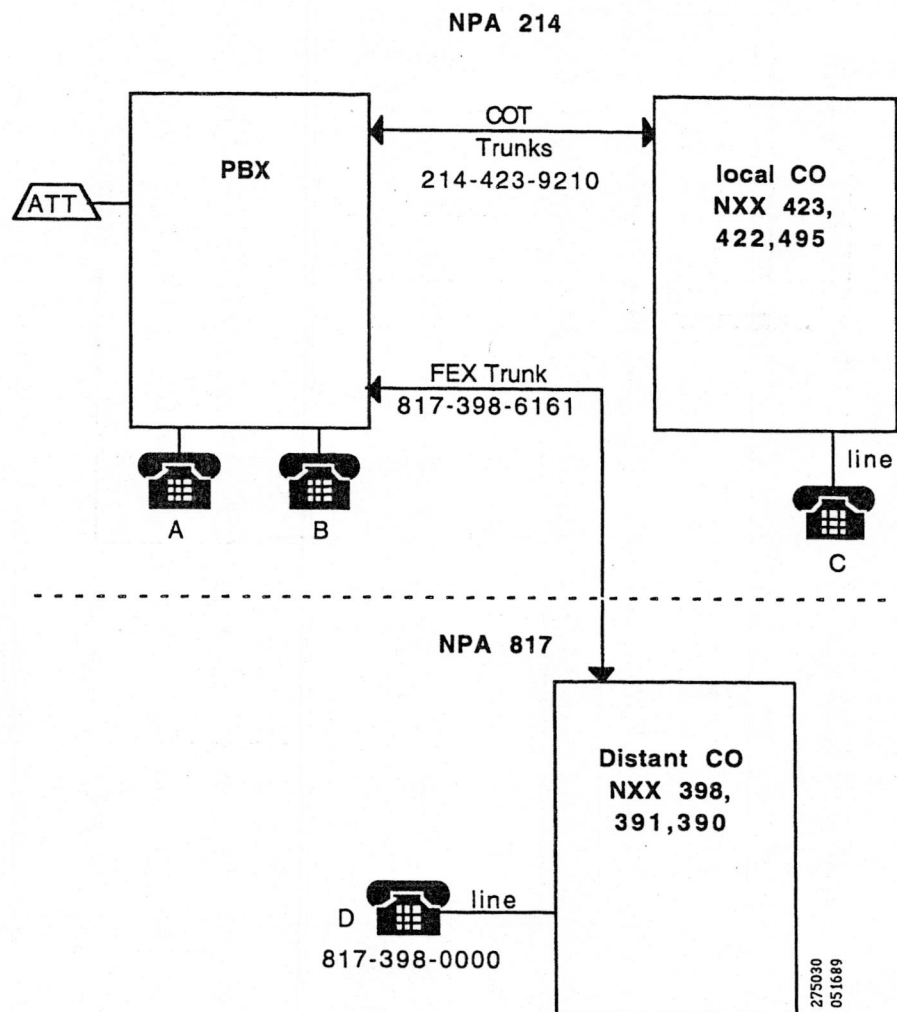
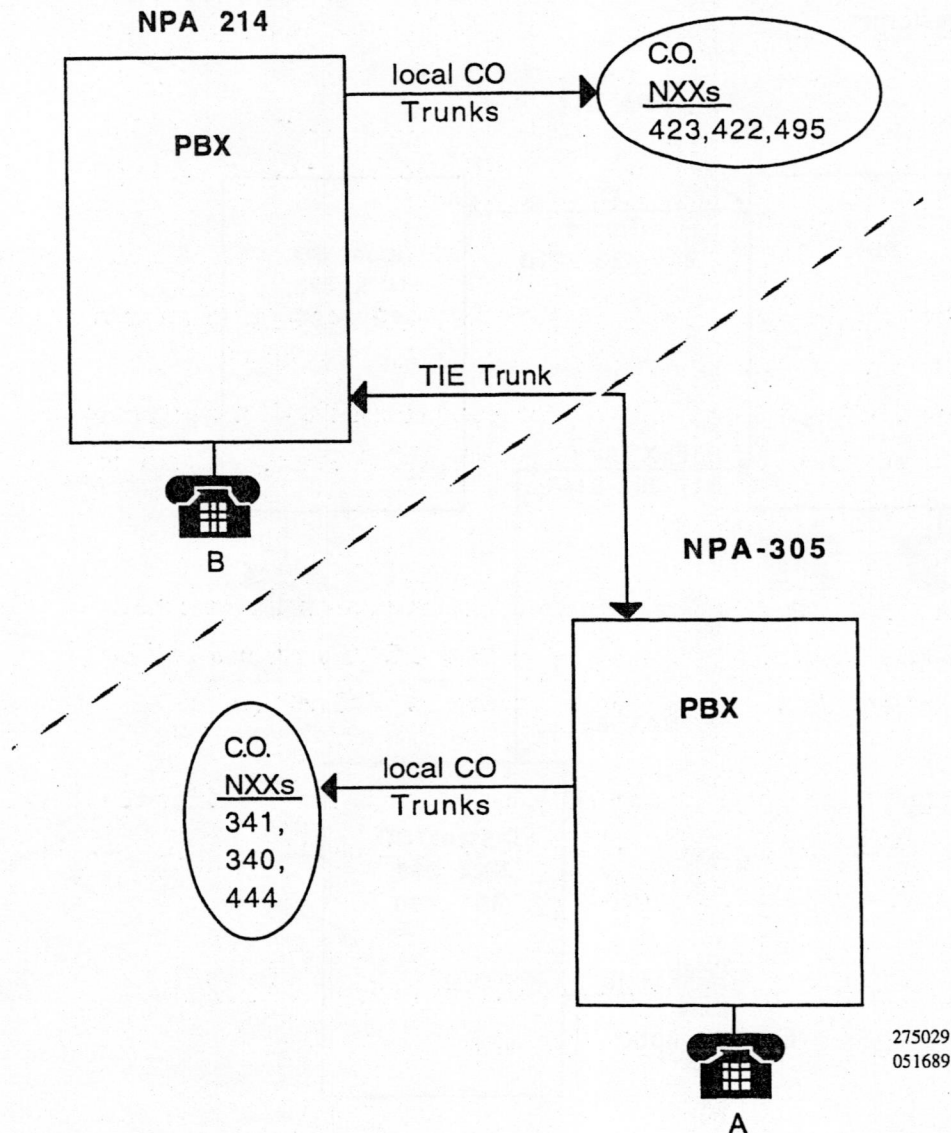


Figure 4

TIE

TIE trunks connect two PBXs. TIE trunks may be incoming only, outgoing only, or two-way. Unless restricted in the database of the PBX on the terminating end, a tie trunk may be used to access any of the terminating PBX's outgoing facilities.

**Figure 5**

OTHER COMMON CARRIER (OCC)

OCC service is provided by companies other than the serving telco. OCC service enables a customer to make long distance calls typically at lower cost than COTs.

OCCs provide the following types of service:

- 1). Dial-up Service. OCC dial-up service uses Central Office-Type trunks to access the OCC's network. OCC networks may cover most of the United States; however, they don't necessarily serve every exchange in a given area code, or may not be cost effective for every exchange within a given area code.
- 2). Central Office-Type trunks to access the OCC's network. (Similar to dial-up Service but provides Automatic Number Identification and Answer Supervision.) An OCC user will access the OCC network by dialing 950-WXXX where W is 0 or 1 and XXX is a code identifying the carrier.
- 3). Full Equal Access. Uses Central Office-Type trunks to access the OCC's network. A user will presubscribe to OCC service and all long distance calls via COTs will be routed to the OCC network.
- 4). Direct Carrier Access. The user dials 10XXX, where XXX is a code identifying the carrier. This is used to select an alternative to the specified equal access carrier.
- 5). Dedicated Access Lines - uses a direct connection (TIE trunks) between a PBX and the OCC network.

TYPICAL TELEPHONE NUMBER FORMATS

The basic components of a standard North American telephone number are:

(1)+NPA+NXX+XXXX

- (1) - one before a long distance number may or may not be required, dependant upon the point of origin.
 - NPA - Numbering Plan Area (Area Code)
NPA
N = 2-9
P = 0 or 1 (or 0-9 for Release 19+ to support the NANP)
A = 0-9
 - NXX (NNX*) - Office Code or Prefix
NXX
N = 2-9
X = 0-9
- * The term NNX is generally used to refer to office codes in areas where 0 and 1 are not used as the second digit.
- XXXX - Station Code or DN
XXXX
X = 0-9

Any telephone number dialed from within a PBX requires an access code preceding the NXX or NPA in order to access a trunk facility.

DIGIT REQUIREMENTS: COT

The standard digit requirements for calls placed over COT-type trunks are:

<u>TYPE OF CALL</u>	<u>DIGITS REQUIRED</u>
• Local	NXX+XXXX
• Long distance within Home NPA (toll)	(1)+HNPA+NXX+XXXX or (1)+NXX+XXXX
• Long Distance(DDD)	(1)+NPA+NXX+XXXX
• Operator Assisted and credit card	0+NPA+NXX+XXXX
• *International DDD	011+CC+NN
• *Operator Assisted International	01+CC+NN
• Outside Operator (local)	0
• Outside Operator (long distance)	00
• Information	(1)+411 or (1)+555+1212 or (1)+NPA+555+1212
• Emergency (most commonly)	911
• Repair (local telco)	611
• Toll Free Numbers	(1)+800+NXX+XXXX
• Dial-it Numbers	(1)+900+NXX+XXXX or 976+XXXX or (1)+700+NXX+XXXX

Depending on point of origin, the (1) may not be required.

*CC=Country code. NN=National number. The country code may be two or three digits in length. The length and format of the national number depends on the dialing plan employed by the country being called.

DIGIT REQUIREMENTS: WATS

The standard digit requirements for calls placed over WATS trunks are:

<u>TYPE OF CALL</u>	<u>DIGITS REQUIRED</u>
• Long Distance (DDD)	(1)+NPA+NXX+XXXX
• Operator Assisted (DDD)	0+NPA+NXX+XXXX
• Long Distance within Home NPA (toll)	(1)+HNPA+NXX+XXXX or (1)+NXX+XXXX

DIGIT REQUIREMENTS: FEX

The standard digit requirements for calls placed over FX trunks are:

<u>TYPE OF CALL</u>	<u>DIGITS REQUIRED</u>
• Local to FEX (within home NPA)	NXX+XXXX
• Toll to FEX (format depends on FEX's point of origin)	(1)+NPA+NXX+XXXX

DIGIT REQUIREMENTS: TIE

The standard digit requirements for calls placed over TIE trunks are:

TYPE OF CALLDIGITS REQUIRED

- Station to Station XXXX
- Local to terminating PBX *AC+NXX+XXXX
- Toll to terminating PBX *AC+(1)+NPA+NXX+XXXX
(format depends on location of distant PBX)
* Access Code of terminating PBX's trunking facilities.

DIGIT REQUIREMENTS: OCC

1) The standard digit requirements for dial-up service to an OCC are:

- The user must first dial the local OCC telephone number -
NXX+XXXX
- The user waits until a tone is received from the OCC network
- The user enters an authorization code - XX...XX

CALL TYPEDIGITS REQUIRED

- Long distance (DDD) (1)+NPA+NXX+XXXX
- Long distance within Home NPA (toll) (1)+HNPA+NXX+XXXX
or (1)+NXX+XXXX

2) The standard digit requirements for Central Office-type trunk access an OCC are:

- The user must dial the carrier code -
950+WXXX
W = 0 or 1
XXX = 0-9 (identifies carrier)

CALL TYPE

DIGITS REQUIRED

- Long distance (DDD) (1)+NPA+NXX+XXXX
- Long distance within Home NPA (toll) (1)+HNPA+NXX+XXXX
or (1)+NXX+XXXX

3) The standard digit requirements for full equal access to an OCC are:

CALL TYPE

DIGITS REQUIRED

- Long distance (DDD) (1)+NPA+NXX+XXXX
- Long distance within Home NPA (toll) (1)+HNPA+NXX+XXXX
or (1)+NXX+XXXX

4) The standard digit requirements for direct carrier access to an OCC are:

- The user must dial the carrier code:
10XXX
XXX + 0-9 (identifies carrier)

CALL TYPE

DIGITS REQUIRED

- Long distance (DDD) (1)+NPA+NXXX+XXXX
- Long distance within the Home NPA (toll) 1)+HNPA+NXX+XXXX
or (1)+NXX+XXXX

- 5). The standard digit requirements for calls placed over dedicated TIE trunks to an OCC are:

CALL TYPEDIGITS REQUIRED

- | | |
|------------------------|-------------------|
| • Long distance (DDD) | (1)+NPA+NXX+XXXX |
| • Long distance within | (1)+HNPA+NXX+XXXX |
| Home NPA (toll) | or (1)+NXX+XXXX |

TRUNK ROUTE COST EFFECTIVENESS

The different types of trunks vary in cost effectiveness. The typical order of cost effectiveness from least expensive to most expensive is:

- TIE
- FX
- OCC
- WATS
- COT

**This order may vary by time of day, local telco tariffs and usage.
(The order specified above will be used throughout this course except where otherwise specified.)**



MODULE 2

OBJECTIVES

The Electronic Switched Network (ESN) is a private communications network intended for use by large business customers with distributed operating locations. This module provides an overview of call routing through an Electronic Switched Network and definitions for components of an Electronic Switched Network. Terms that will be used through out this course will also be introduced.

Given the Student Guide and class notes, the student should be able to:

- Identify how a call is processed through a private voice network.
- Identify the functions and parameters of components of a private voice network.
- Identify definitions of Meridian 1 ESN Node, Meridian 1 ESN Main, Conventional Main, and virtual locations.
- Identify definitions of terms used throughout the course.

PRIVATE VOICE NETWORK DEFINITION

A network of access lines and trunks linked together by Common Controlled Switching Arrangements (CCSA) to switch calls among several served locations of the same customer.

Telephony magazine's "Glossary of Communications" calls a private voice network a "switched services network."

Electronic Switched Network (ESN) is Northern Telecom's private voice network.

BENEFITS OF ELECTRONIC SWITCHED NETWORK

The features and capabilities inherent in ESN provide numerous benefits to organizations and their employees.

Among these benefits are:

- Reduced communications cost .
- Centralized management control of facilities.
- Increased user convenience.
- Increased employee productivity.
- Customer control of maintenance communications facilities.
- Improved transmission
- Product compatibility with non-Northern Telecom equipment

PRIVATE VOICE NETWORK COMPONENTS

There are two components of a private voice Network:

- Switches
- TIE trunks

Switches

Perform switching of calls among stations and to the public network. They can provide access to other switches via private network or public switched network.

Tie Trunks

Provide the transmission facility between customer locations.

Call Routing on Private Voice Networks

Tie trunks are typically the first choice for calls to stations at other switches and to the free calling area of the public network surrounding those switches.

Public network trunks are typically the alternate choice:

- FEX
- OCC
- WATS
- COT

(The order of cost-effectiveness specified above will be used throughout this course except where otherwise specified.)

Primary Elements of ESN

ESN is comprised of two elements:

- Switches
- Network Support

Switch Definitions

Meridian 1 ESN Node - A Meridian 1 switch that is equipped with the features identified in Table A and is configured in the network as a primary switching center.

Meridian 1 ESN Main - A Meridian 1 switch that is equipped with some or all features identified in Table A and is connected to a single Meridian 1 ESN Node via tie trunks.

Conventional Main - A switch (M1 or any other type) that is connected to a Meridian 1 ESN Node and is not equipped with the features required by a Meridian 1 ESN Main.

Virtual Location - A switch (Meridian 1 or any other type) that has been configured as part of the network, but is not connected to the network via tie trunks.

Satellite Location - A switch (Meridian 1 or any other type) that is connected to any Main via tie trunks.

Feature Package Requirements

Table A

<u>Feature Packages</u>	<u>ESN node</u>	<u>ESN main</u>
Network Alternate Route Selection (NARS) (includes BRTE, NCOS)	X*	X(opt)
Network Signaling (NSIG) (This package required for full network functionality)	X	X
Network Class of Service (NCOS)	X	X
Basic Alternate Route Selection (BARS) (includes BRTE, NCOS)	X*	X(opt)

* A Node **must** be equipped with either NARS or BARS.

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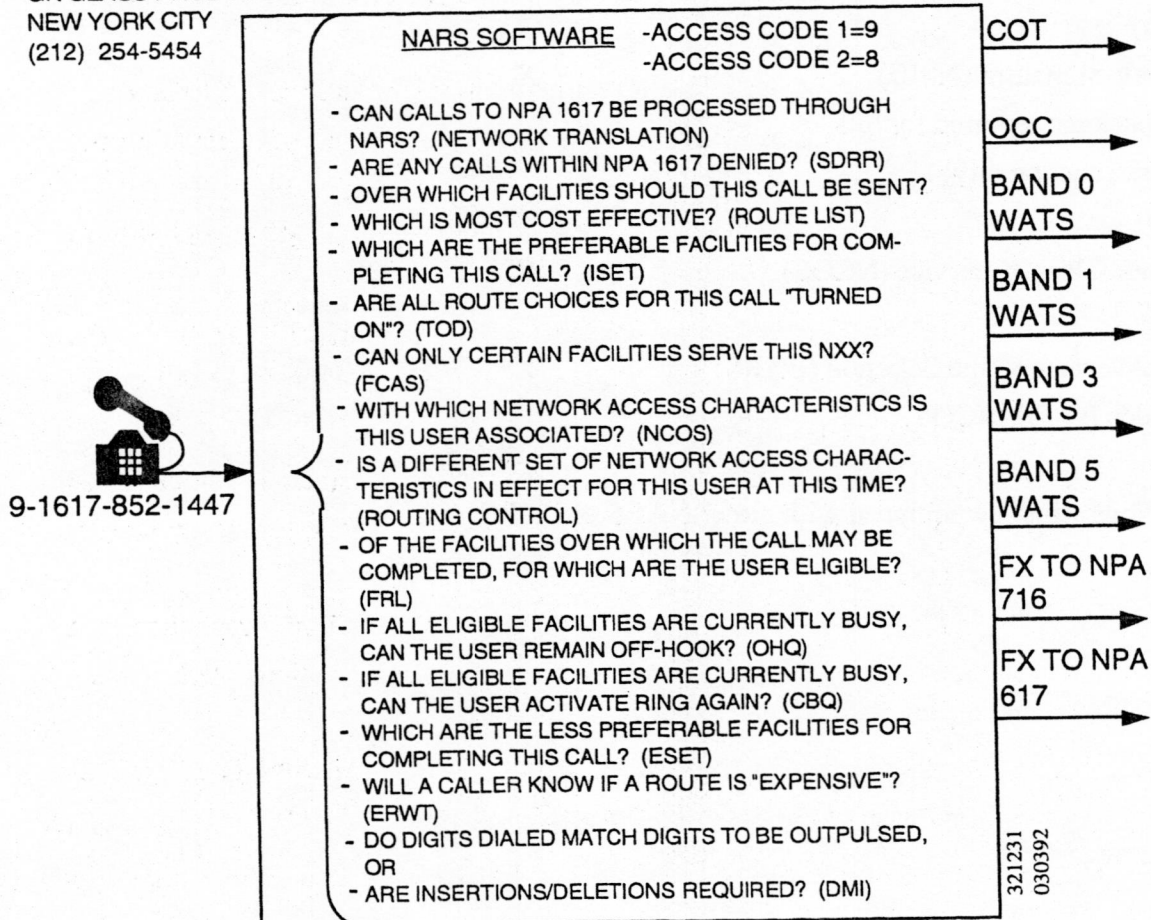


Figure 1

ESN NODE FUNCTION

The Meridian 1 ESN Node's function is to direct calls from a switch in one geographical location to a destination in another geographical location in a cost-effective and easy to use manner by:

- eliminating long, complex dialing plans and replacing them with a Uniform Dialing Plan (UDP) common to all switches which are part of the ESN.
- providing a means of controlling the number and type of trunks that are available to each network user, and a method of controlling the time of day during which access to a facility is allowed.
- selecting automatically the most cost effective facility available to complete a call.
- providing uniform network access to stations served directly by the ESN Node and stations served at Meridian 1 ESN Mains and Conventional Mains.
- providing the call originator with the option to either accept or refuse completion of a call over an expensive facility, if no less costly facility is currently available.
- providing queuing features which enables the call originator to remain off-hook or hang up and receive a call-back from the system when a trunk becomes idle.
- collecting and printing operational statistics related to the ESN. This enables the efficiency of the network to be monitored.

ESN CONFIGURATIONS

A Meridian 1 ESN Node may be a combined network switch and PBX. Meridian 1 ESN Nodes are strategically located to concentrate on on-network traffic and to access off-network facilities efficiently and economically. An ESN may comprise a single ESN Node serving a few locations, or multiple ESN Nodes serving up to 999 locations. A Coordinated Dialing Plan (CDP) (see figure 4) or a Uniform Dialing Plan (UDP) (figure 5) may provide simplified dialing schemes for calls from one network PBX to another.

SINGLE NODE

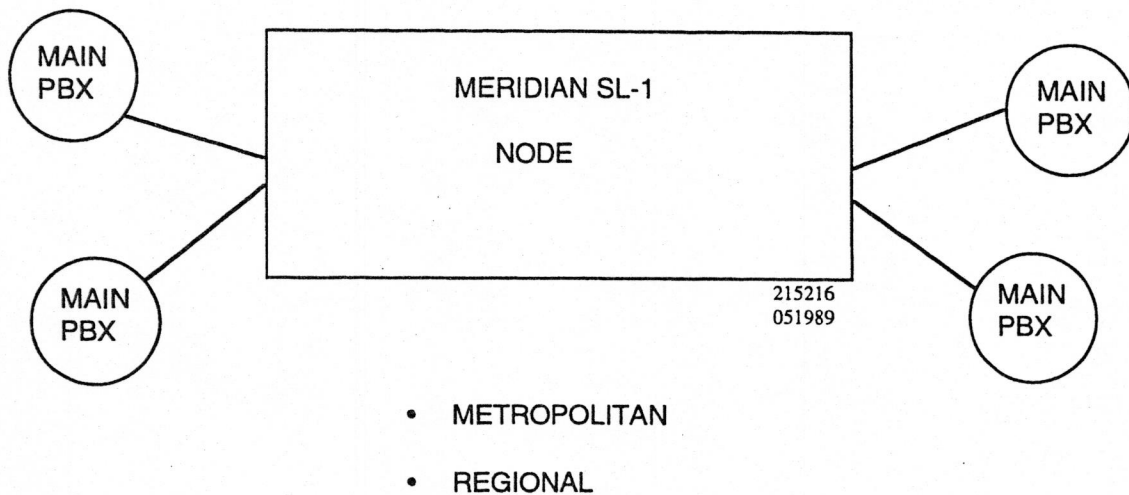
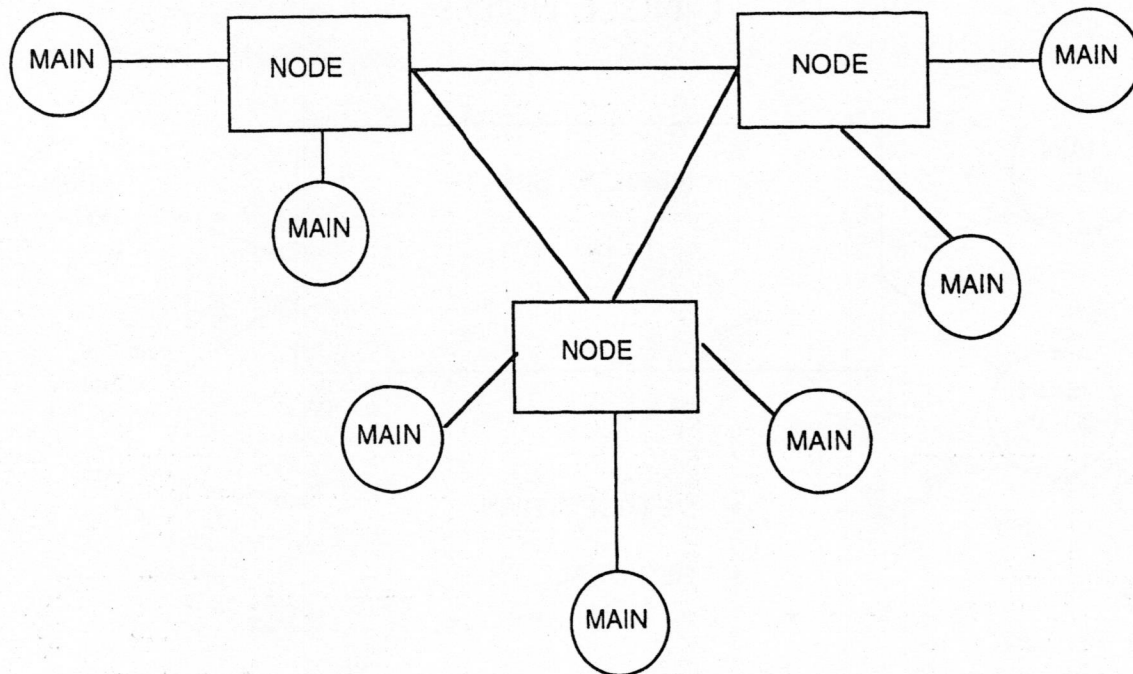


Figure 2

MULTI-NODE



- WIDE AREA METROPOLITAN
- REGIONAL

121215
051989

Figure 3

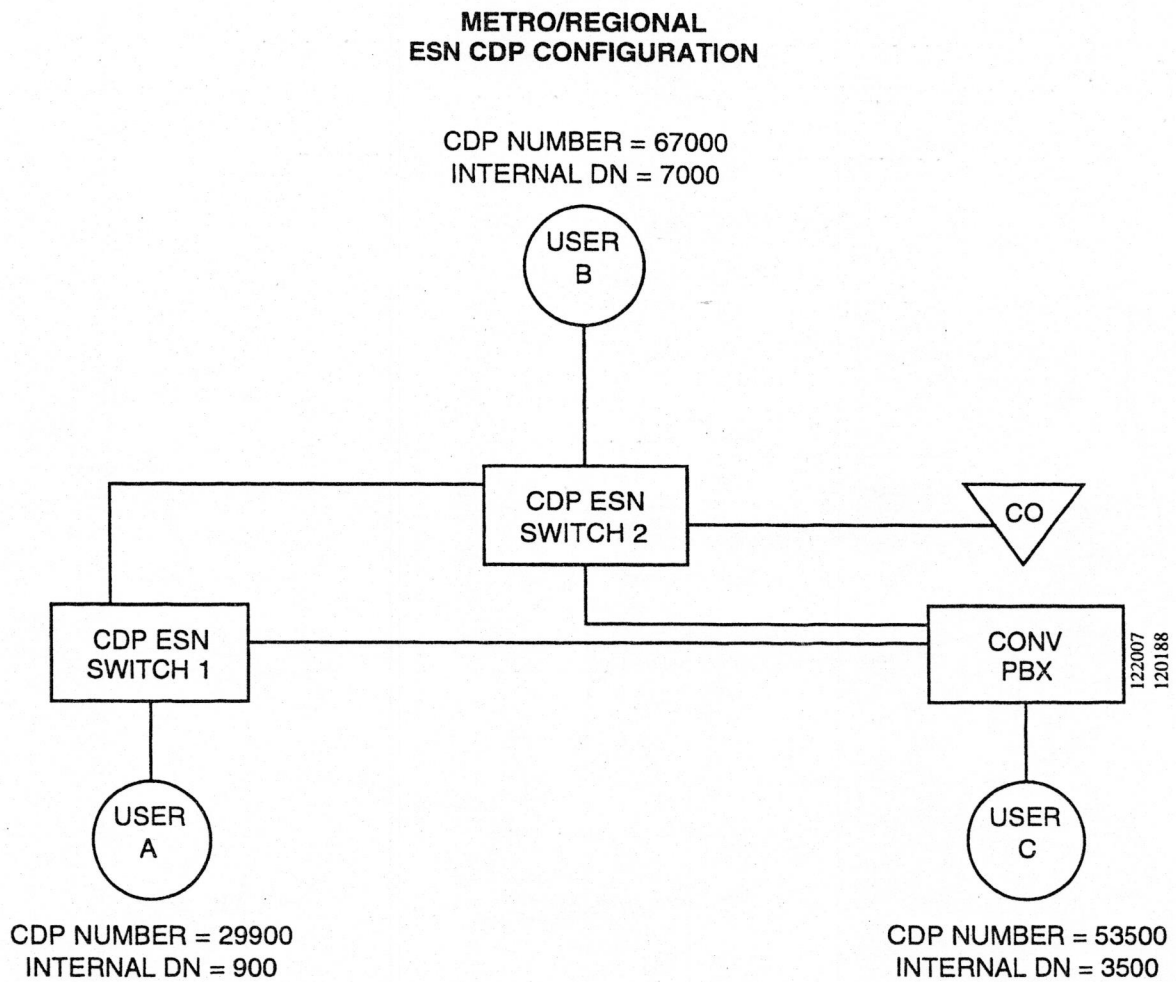


Figure 4

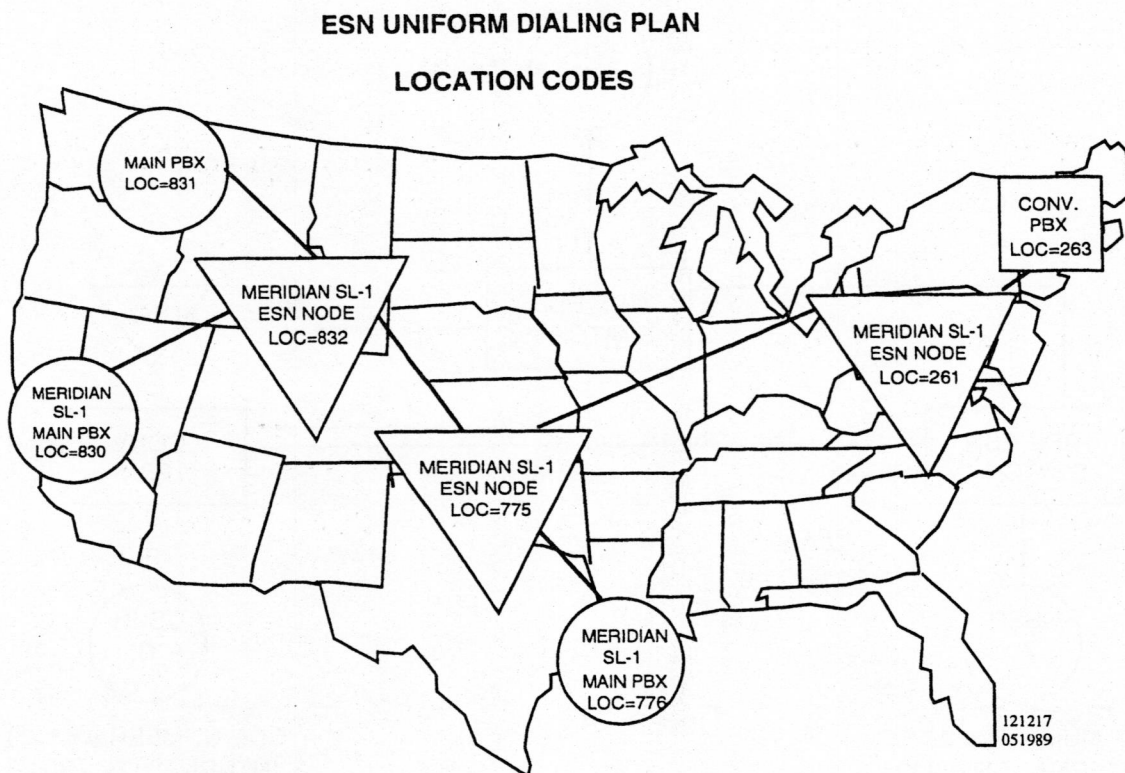


Figure 5

COORDINATED DIALING PLAN (CDP)

The optional CDP feature enables a customer having a number of switches to coordinate the dialing plan of the stations at these switches by enabling a station user to call any other station within the CDP group of switches by dialing a unique number (figure 4).

UNIFORM DIALING PLAN (UDP)

UDP enables users at an Meridian 1 Node, Meridian 1 ESN Main, or Conventional Main to dial calls in a uniform manner regardless of the location of the calling party or the route which the call will take (figure 5).

UDP for On-Net Calls

An on-network call is one which originates and terminates at a network location. To reach any on-net location, the user dials the on-net access code, followed by the UDP location code and the station number. The format for this call would be:

- Access Code + Location Code+ DN.

UDP for Off-Net Calls

An off-network call is one which originates at a network location but does not terminate at a network location, even though some network facilities may be used to complete a portion of the call routing.

The following shows typical dialing formats for on-net, off-net and long distance calls when using a Uniform Dialing Plan.

TYPICAL DIALING FORMAT FOR UDP CALLS

CALL TYPE	DIALING FORMAT
On-net	AC1+LOC+XXXX
Long distance (DDD)	AC1+(1)+NPA+NXX+XXXX
Operator-assisted DDD	AC1+0+NPA+NXX+XXXX
Long distance information	AC1+(1)+NPA+555+1212
International	AC1+011+CC+NN
Operator-assisted International	AC1+01+CC+NN
Network Speed Call	AC1+LA+EN (LA = List Access Code. EN = List Entry Number.)
Long distance within Home NPA (toll)	AC1+(1)+HNPA+NXX+XXXX or AC2+(1)+NXX+XXXX
Local operator	AC2+0
Local calls	AC2+NXX+XXXX
Local information	AC2+(1)+411 or AC2+(1)+555-1212
Local emergency (typically)	AC2+911
Local repair (Telco)	AC2+611

TYPICAL DIALING FORMAT FOR UDP CALLS

CALL TYPE	DIALING FORMAT
TOLL-FREE	AC2+(1)+800+NXX+XXXX
DIAL-IT NUMBERS	AC2+(1)+900+NXX+XXXX or AC2+976+XXXX or AC2+(1)+700+NXX+XXXX

AC1 = Access code typically used for on-net, long distance and Network Speed Call.

AC2 = Access code typically used for local calls. (1) = 1 may or may not be required.

ESN TERMS

Authorization Codes - Enables selected network users to temporarily replace the access restrictions assigned to a station or tie trunk.

Automatic On-Net to Off-Net Overflow - Ability of NARS to convert a dialed UDP number to a public number of the destination, and use off-net facilities to complete the call.

Call Back Queuing (CBQ) - The ability of a station user to activate Ring Again and go into queue when network facilities are busy.

Call Back Queuing to Conventional Mains (CBQCM) - CBQCM enables call originators at a Conventional Main to access the CBQ feature at a Meridian 1 ESN Node.

Coordinated Dialing Plan (CDP) - A Meridian 1 feature which allows several PBXs to use a common station dialing plan.

Coordinated Call Back Queuing (CCBQ) - Enables stations at a Meridian 1 ESN Main to access CBQ when network facilities are busy at the serving Meridian 1 Node.

Direct Distance Dialing (DDD) - The ability to place long-distance calls over the public switched network without operator assistance.

Digit Manipulation Table (DMI) - A data structure identifying digit insertions and/or deletions that must be performed before a call can be outpulsed. (Necessary to meet the dialing requirements of different trunk types.)

Hop Off - Leave the ESN network for another network.

Initial Set (ISET) - Those routes in a Route List on which a Node may attempt to complete a call before testing for queue eligibility

Expensive Route Warning Tone (ERWT) - A three bursts of tone sent to the calling station if an outgoing route has been designated as expensive.

Extended Set (ESET) - All routes in a Route List that are not included in the Initial set.

Free Calling Area Screening Table (FCAS) - Identifies the NXXs within an NPA which may be served by a particular Route List entry.

Facility Restriction Level (FRL) - A number associated with the NCOS of a caller, which determines the outgoing facilities the caller may use.

Location Code - A three-digit code which identifies a network PBX for on-net calls.

Main - A network PBX that is connected to a Node via tie trunks.

Network Alternate Route Selection (NARS) - The translation and alternate routing features of ESN.

Network Class of Service (NCOS) - A number associated with a call originator, which determines a user's network access characteristics.

Network Transfer - Eliminates the use of multiple tie trunks when transferring a call back to the originating PBX.

Network Signaling (NSIG) - Provides the required signaling protocol to interface network PBXs.

Node - A network PBX that has the NARS (Network Alternate Route Selection) package and is configured as a major tandem switching center in the network.

Other Common Carrier (OCC) - A provider of network or transmission services other than the local telephone company.

Off Hook Queuing (OHQ) - Queuing in which the user originating the call to the PBX at which the queuing occurs remains off-hook until the call is completed or a timer expires.

Off-Network (Off-Net) - A call which originates at an ESN location but does not terminate at one.

On-Network (On-Net) - A call which originates and terminates at ESN locations.

PBX Hop Off - To leave the ESN network for another network at a Main rather than at a Node.

Route List - A group of outgoing trunk routes listed in the order they are to be searched by the network when completing a call.

Satellite Link Control - Ensures that the configuration of a call does not include more than one communications satellite trunk.

Steering Code - A digit sequence used by the CDP translation mechanism to determine the routing of a CDP call.

Translation Table - A data structure which associates the access code and first one to eleven digits of a dialed number with a Route List.

Virtual Location - A network PBX that has been assigned a location code, but is not connected to the network by tie trunks.

Feature Package	Mnemonic	Package Number	Dependency
•Basic Authorization Code	BAUT	25	CAB
•Basic Automatic Route Selection	BARS	57	BRTE,NCOS
•Basic Queuing	BQUE	28	
•Basic Routing	BRTE	14	NCOS
•Charge/Authorization Base Package	CAB	24	
•Coordinated Call-Back Queuing	CCBQ	38 (MCBQ)	NSIG,FCBQ
•Coordinated Call-Back Queuing to Conventional Mains	CCBQCM	38 (MCBQ)	BRTE,NCOS, FCBQ
•Coordinated Dialing Plan	CDP	59	NCOS
•Flexible Call-Back Queuing	FCBQ	61	BARS,NARS, or CDP,BQUE

321008
022092

Figure 7

Feature Package	Mnemonic	Package Number	Dependency
•New Flexible Code Restriction	NFCR	49	NCOS
•Network Authorization Code	NAUT	63	NARS,BARS, or CDP
•Network Automatic Route Selection	NARS	58	BAUT,CAB BRTE,NCOS
•Network Class of Service	NCOS	32	
•Network Transfer	NXFR	67	NSIG,NCOS
•Network Queuing-Main	MCBQ	38	NSIG,FCBQ, NCOS
•Network Signaling	NSIG	37	NCOS
•Network Speed Call	NSC	39	NARS,BARS, or CDP
•Network Traffic	NTRF	29	SSC BARS,NARS, or CDP

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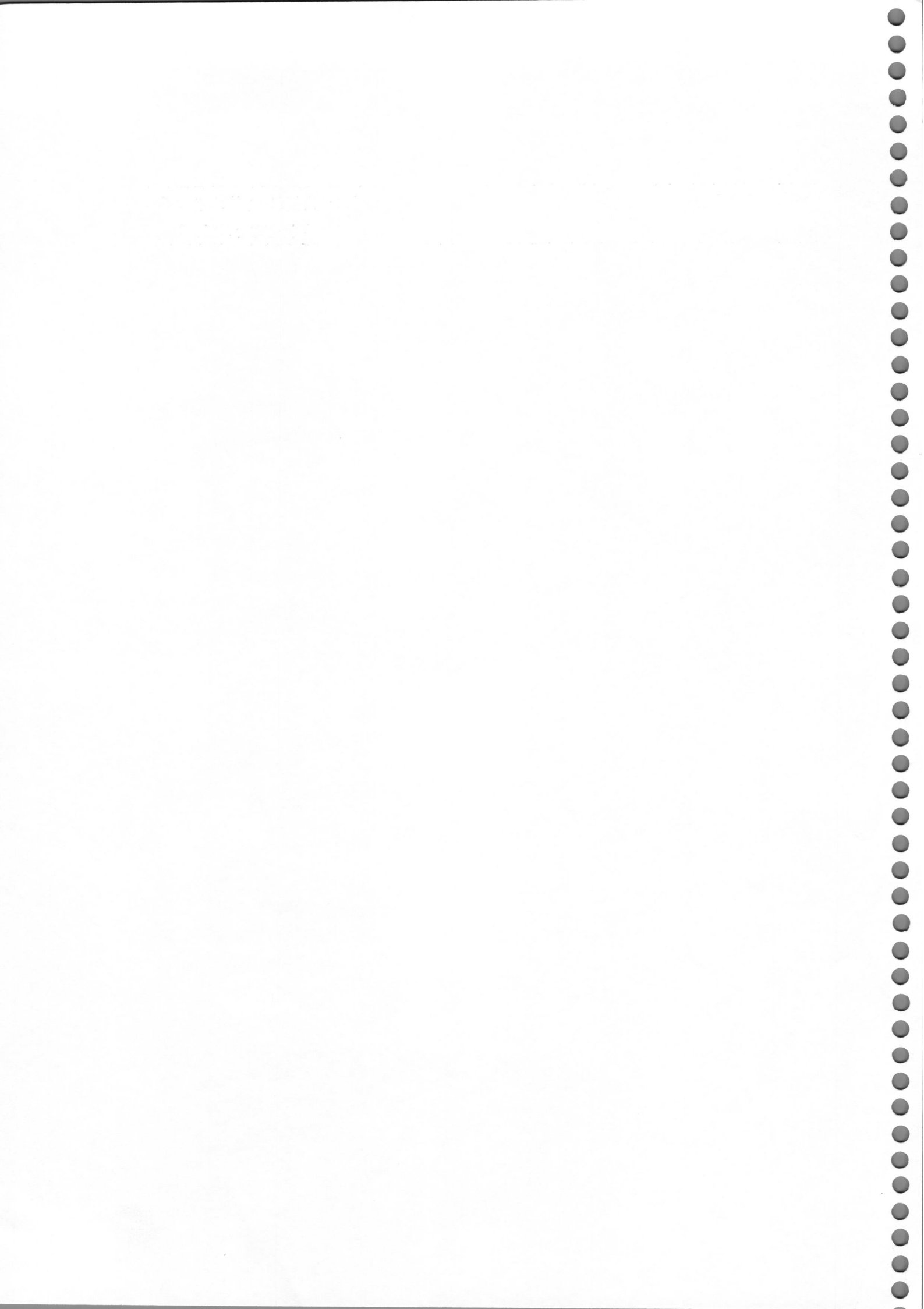
Figure 7, (Cont'd.)

Feature Package	Mnemonic	Package Number	Dependency
•Off-hook Queuing	OHQ	62	BARS or NARS,BQUE
•Priority Queuing	PQUE	60	NCOS

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Figure 7, (Cont'd.)





MODULE 3

**DESCRIBING THE NARS
ACCESS CODES**

MODULE 3**OBJECTIVES**

This module explains the purpose and parameters of the NARS Access Codes. Network or outside calls from an ESN Node or Main location are made by dialing one of two NARS Access Codes followed by the desired number. Dialing one of these two codes triggers the NARS software to perform the call-processing and routing required for call completion. This module describes the purpose and parameters of the NARS Access Codes. Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of NARS Access Codes.
- Identify the parameters of the NARS Access Codes.
- Identify the limitations of the NARS Access Codes.
- Identify the impact of the NARS Access Codes on the customer's numbering plan.
- Identify the prompts and responses required to provision the NARS Access Codes.

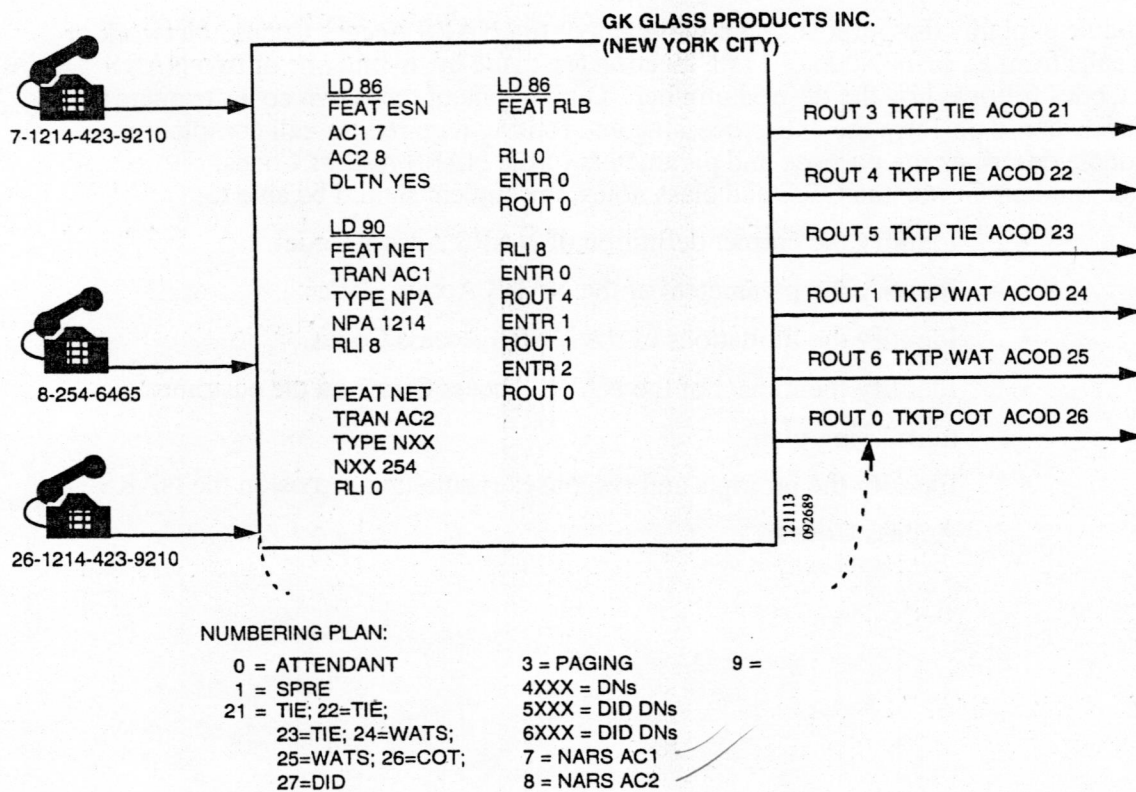


Figure 1

DEFINITION

To access NARS, the user dials one of two customer-defined NARS access codes (AC1 or AC2) followed by the desired number. Dialing one of the two NARS access codes triggers the NARS software to perform the call processing and routing required for call completion.

PARAMETERS

- The NARS access codes may be any one- or two-digit numbers which do not conflict with the customer's numbering plan.
- AC1 is typically the access code for on-net, long distance, and Network Speed Call calls. AC2 is typically the access code for local (off-net) calls.
- Dialing AC1 will send the call to Translation Table 1.
- Dialing AC2 will send the call to Translation Table 2.
- Dial tone may be provided to the user after the NARS access codes are dialed.

FEATURE INTERACTIONS

- If the NARS access codes have been defined but other portions of the NARS data base have not, thus preventing the call from being completed through NARS, the user will receive intercept treatment (overflow tone, recorded announcement, or route to the attendant).



MODULE 4

**DESCRIBING UNIFORM
DIALING PLAN (UDP)**

MODULE 4**OBJECTIVES**

This module describes the various ways a Uniform Dialing Plan (UDP) may provide dialing transparency. Dialing transparency allows station users at a Meridian 1 ESN Node, Meridian 1 ESN Main or Conventional Main to dial all calls in a uniform manner (UDP) regardless of the location of the calling party or the route which the call will take.

Given the Student Guide and class notes, the student should be able to:

- Identify the correct definition of Uniform Dialing Plan.
- List the ways dialing transparency is accomplished.

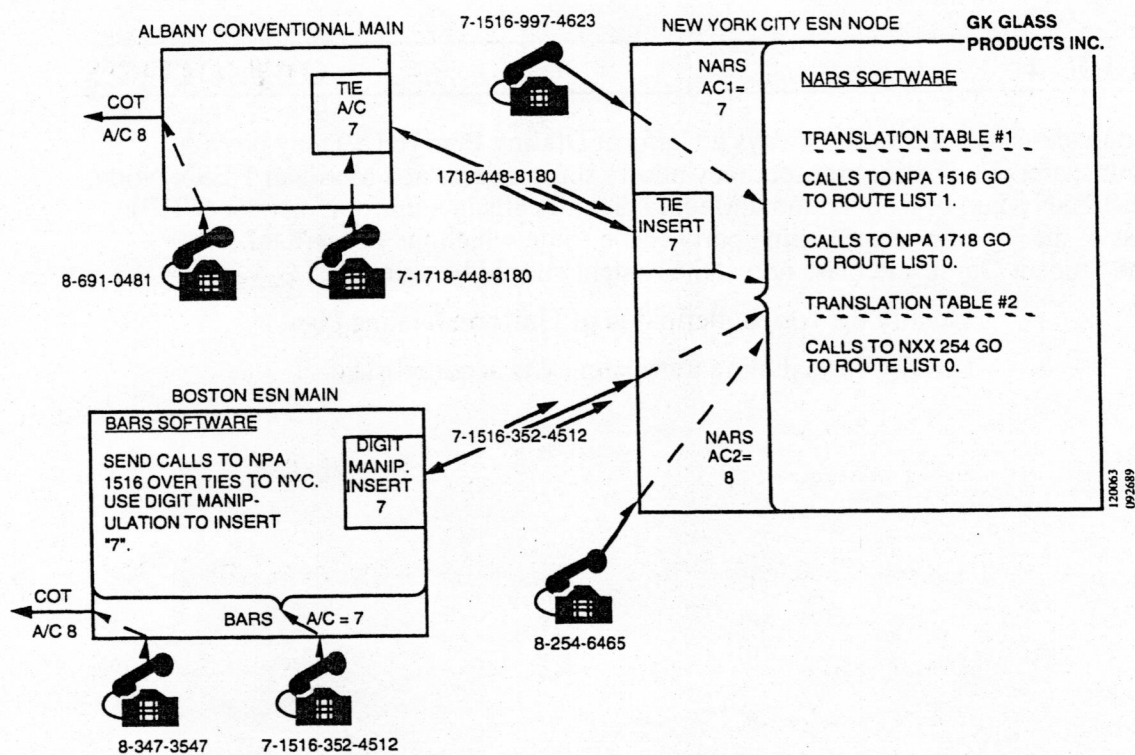


Figure 1

DEFINITION

Uniform Dialing Plan allows users at an Meridian 1 ESN Main or Conventional Main to dial all calls in a uniform manner, regardless of the location of the calling party or the route which the call will take.

PARAMETERS

- For a Conventional Main or a Meridian 1 ESN Main that is not equipped with BARS or NARS software, UDP is provided via:
 - Single tie trunk group access from Main to Node.
 - The access code for the trunk group will be the same as AC1 programmed at the Node.
 - The M-1 Node is programmed to insert AC1 for all incoming calls via the tie trunk group from the Main.
 - At Mains, the access code for the CO trunk group will be the same as AC2 programmed at the M-1 Node.
- For users at a Meridian 1 ESN Main that is equipped with BARS software, UDP is provided via:
 - Single tie trunk group access from Main to Node.
 - In the Meridian 1 ESN Main, the access code to BARS will be the same as AC1 programmed at the Meridian 1 Node.
 - The BARS software at the ESN Main is programmed to insert AC1 (via the Digit Manipulation feature) on all outgoing calls routed over the tie trunks to the Node.



MODULE 5

**DESCRIBING
NETWORK TRANSLATION**

MODULE 5**OBJECTIVES**

This module describes how the Meridian 1 performs Network Translation once it has recognized a NARS Access Code.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of Network Translation.
- List the seven types of Network Translation.
- Identify the parameters and limitations of Network Translation.
- List the three possible intercept treatments for calls blocked via Network Translation.
- Identify the prompts and responses required to provision Network Translation.

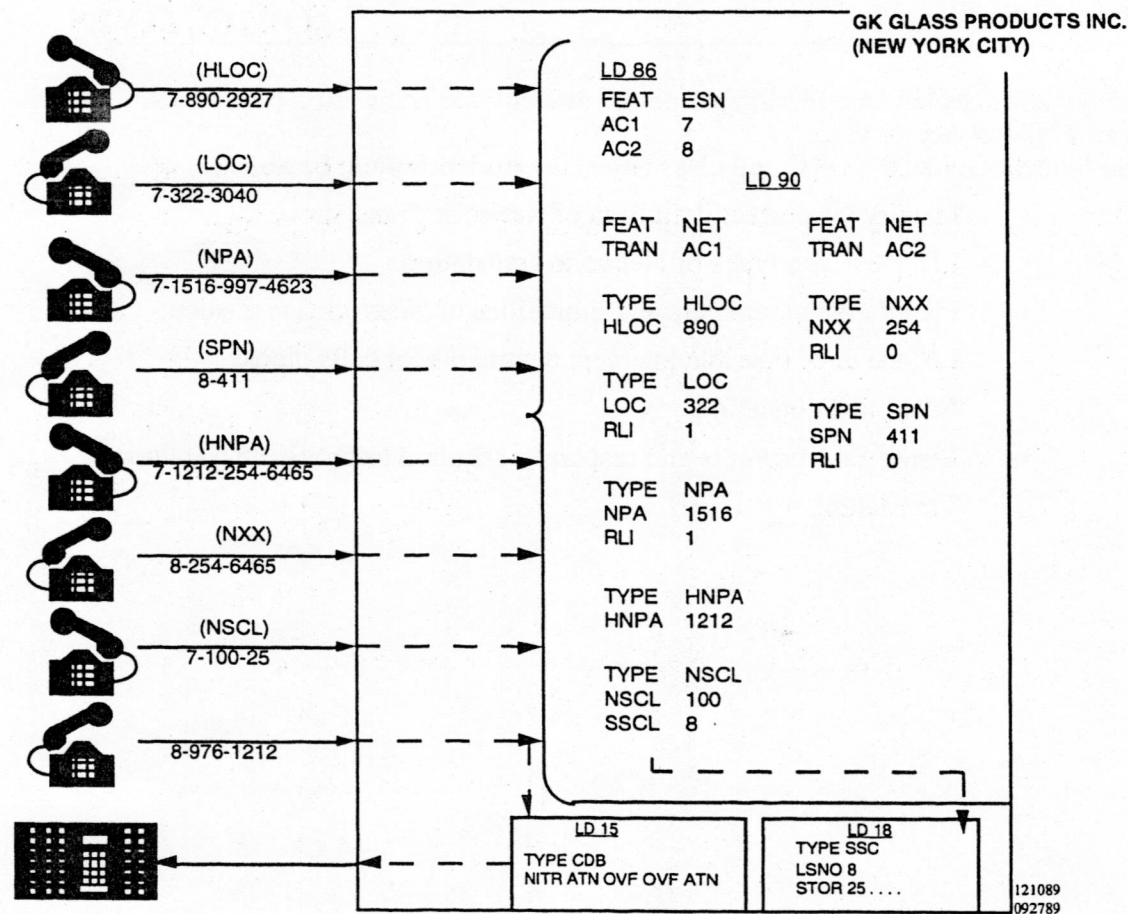


Figure 1

DEFINITION

Network Translation is the process within NARS which identifies the NPA, NXX, SPN, Location Code, Home Location Code, Home NPA, or Network Speed Call Access Code dialed by the call originator and determines the Route List to which the call is to be referred.

PARAMETERS

- There are seven types of Network Translation: NPA, SPN, NXX, Location Code (LOC), Home location code (HLOC), Home NPA (HNPA), and Network Speed Call (NSCL).
- The assignment of code types to translation tables is flexible and may be configured according to the customer's requirements.
- Translation Table #1 is generally used for HLOC, LOC, HNPA, NPA, SPN and NSCL Translation. ON-NET
- Translation Table #2 is generally used for NXX and SPN translation. OFF-NET

LIMITATIONS

- Identical codes may not be assigned within the same translation table.
- Number must be leftwise unique within translation table.

NPA NETWORK TRANSLATION PARAMETERS

- No limit to the number of NPAs.
 - NPAs are typically defined in Translation Table #1.
 - Must be in proper NPA format:
NPA
N = 2-9
P = 0 or 1 (or 0-9, if Release 19+ to support NANP)
A = 0-9
 - Release 1 to Release 3 - An NPA may be three or four digits in length.
 - Release 4 to Release 7 - An NPA may be three or four digits in length.
(NPA or 1 + NPA)
 - Release 8+ - An NPA entry may be three to ten or four to eleven digits in length.
- | | |
|-------|-----------|
| NPA | 1 + NPA |
| NPA-N | 1 + NPA-N |

NPA-NX	1 + NPA-NX
NPA-NXX	1 + NPA-NXX
NPA-NXX-X	1 + NPA-NXX-X
NPA-NXX-XX	1 + NPA-NXX-XX
NPA-NXX-XXX	1 + NPA-NXX-XXX
NPA-NXX-XXXX	1 + NPA-NXX-XXXX

NXX NETWORK TRANSLATION PARAMETERS

- No limit to the number of NXXs.
- NXXs are typically defined in Translation Table #2.
- Must be in proper NXX format:
NXX
N = 2-9
X = 0-9
- Release 1 to Release 3 - An NXX may be three or four digits in length.
- Release 4 to Release 7 - An NXX may be three or four digits in length. (NXX or 1 + NXX)
- Release 8+ - An NXX entry may be three to seven or four to eight digits in length.

NXX	1 + NXX
NXX+X	1 + NXX+X
NXX+XX	1 + NXX+XX
NXX+XXX	1 + NXX+XXX
NXX+XXXX	1 + NXX+XXXX

SPN NETWORK TRANSLATION PARAMETERS

- No limit to the number of SPNs.
- The "local" SPNs (1411, 911 etc.) are generally defined in Translation Table #2.
- The "non-local" SPNs (1800, 1900 etc.) are generally defined in Translation Table #1.
- May be any combination of digits.
- Release 1 to Release 3 - An SPN may be three or four digits in length.

- Release 4 to Release 7 - An SPN may be one to four digits in length.
X
XX
XXX
XXXX
- Release 8+ - An SPN entry may be one to eleven digits in length:
X
XX
XXX
XXXX
XXXXX
XXXXXX
XXXXXXX
XXXXXXXX
XXXXXXXXX
XXXXXXXXXX
XXXXXXXXXXX

FLEXIBLE ESN "0" ROUTING

When an SPN is encountered, a special check is made to determine if a "0" was dialed. If "0" had been dialed, the system waits for the next one or two digits (or end of dialing indication). After the system has received the digits, it proceeds to the data block to look up the appropriate Route List Index (RLI). The system will direct the call to the Route List Index and proceed with call processing.

This feature allows a few predefined, non-leftwise unique dialing sequences, to be entered in a translation table. "Leftwise unique" means that each entry cannot match the leftmost portion of any other entry in the table. For example, if "456" is an entry in the table, no other entry may begin with "456."

The ESN translation table will allow any or all of the following non-leftwise unique numbers (along with their associated route list) to be entered into the ESN translation table:

- 0
- 00
- 01
- 011

LOCATION CODE NETWORK TRANSLATION PARAMETERS

- Total of 999 possible Location Codes.
- Location Codes are typically defined in Translation Table #1.
- May be any combination of digits.
- Release 1 to Release 7 - A location code may be three digits in length.
XXX
- Release 8 - A location code may be three to seven digits in length
(with the first three being the Location Code and the last four being the Directory Number).
XXX
XXX-X
XXX-XX
XXX-XXX
XXX-XXXX

HOME NPA NETWORK TRANSLATION DEFINITION

The purpose of HNPA Network Translation is to locate the HNPA dialed by the call originator in the translation table, delete the HNPA, locate the NXX dialed by call originator in the other translation table, and determine the Route List to which the call is to be referred.

HOME NPA NETWORK TRANSLATION PARAMETERS

- Only one home NPA may be defined per customer.
- Home NPA must be defined in the opposite translation table from NXXs (generally Translation Table #1).
- An HNPA may be three or four digits in length.
NPA or 1 + NPA

HOME LOCATION CODE NETWORK TRANSLATION DEFINITION

The purpose of Home Location Code translation is to locate the Home Location Code dialed by the call originator in the Translation Table, delete the Home Location Code and dial the internal Directory Number. (The Extended DN capability available as of Rls. 13 requires that the Digit Manipulation feature be used to insert leading digits after the HLOC has been deleted in order to create a DN of more than four digits in length.)

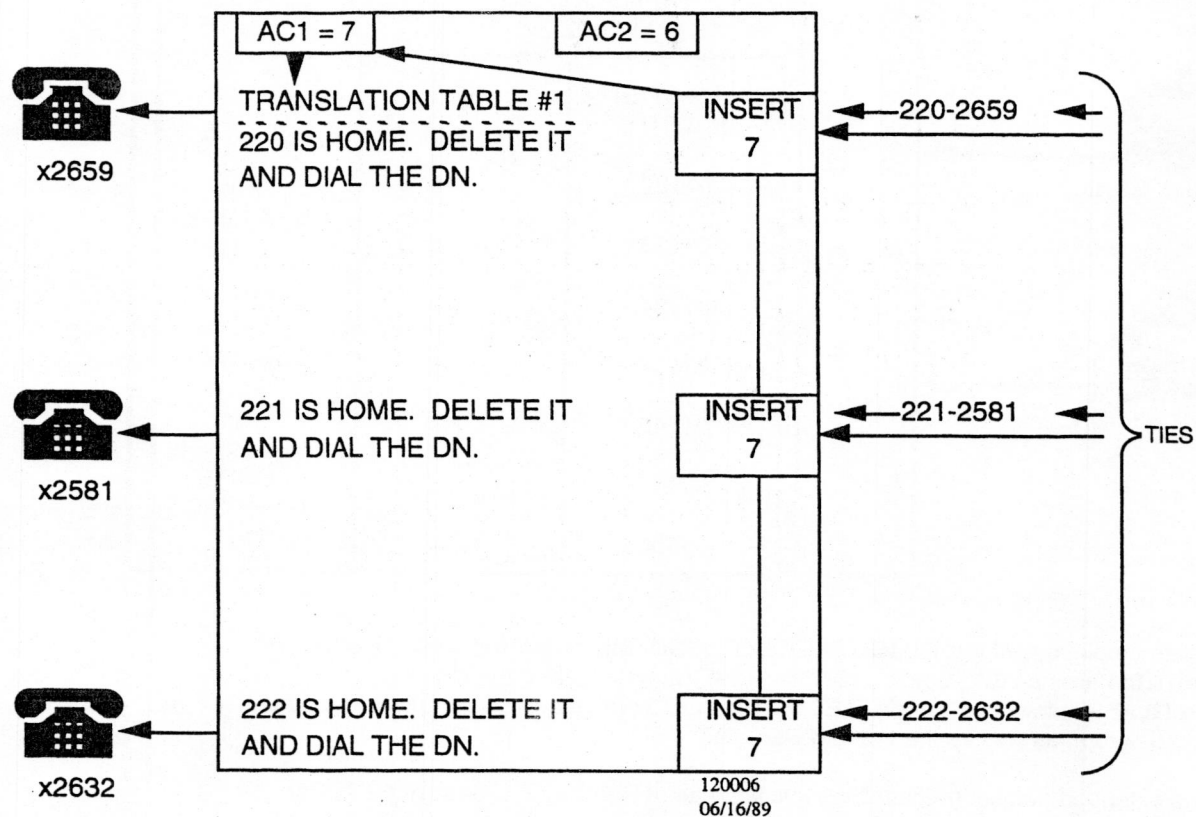
HOME LOCATION CODE TRANSLATION PARAMETERS

- Multiple Home Location Codes.
- Home Location Codes are generally defined in Translation Table #1
- May be any combination of digits.
- Release 1 to Release 7 - An HLOC may be three digits in length.
XXX
- Release 8+ - An HLOC entry may be from three to seven digits in length (with the first three digits being the Location Code and last four digits being the Directory Number).
XXX
XXX-X
XXX-XX
XXX-XXX
XXX-XXXX

INTERACTIONS

- If a call originator dials a number not defined in Network Translation, the user will receive one of three customer-defined intercept treatments (overflow tone, recorded announcement or route to the attendant).
- Memory. - If three-digit translation is used, there will be no additional impact on memory. If four-digit translation is used, the additional impact will be negligible. If eleven-digit translation is used, there will be eleven words of memory used for each digit beyond four.
- Printouts. - In addition to complete Network Translation information available in printouts of translation table data blocks, a summary may be obtained using overlay program 90- (TRAN=SUM).

MULTIPLE HOME LOCATION CODES

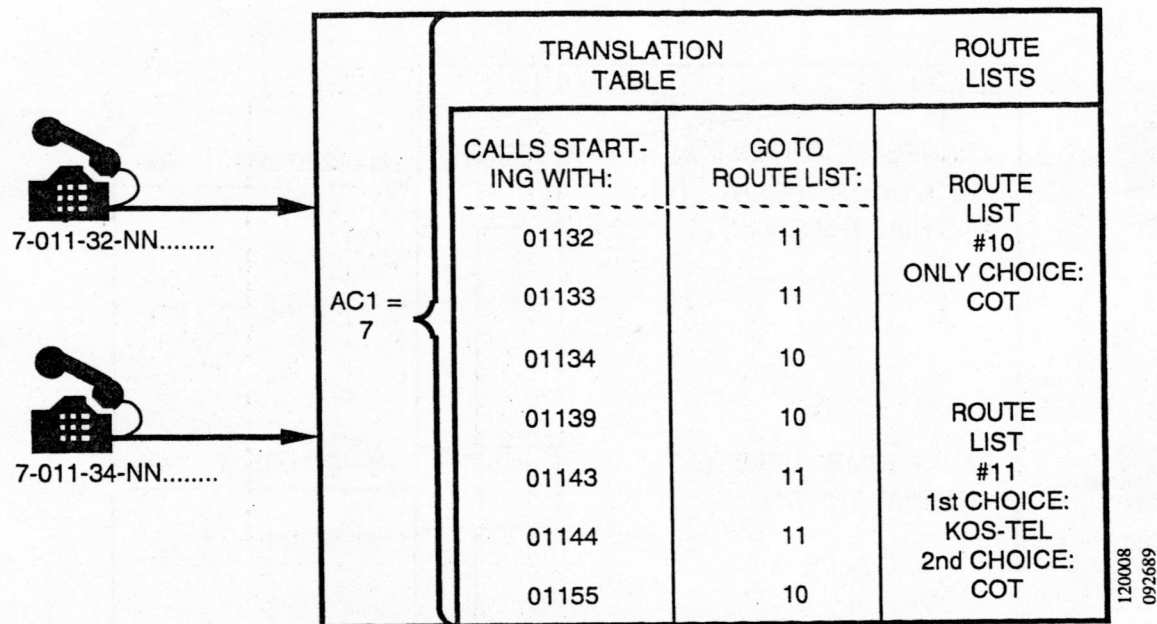


PBX IN HACKETTSTOWN, NJ SUPPORTS THREE
AFFILIATE COMPANIES:

KOSLOWSKI INT'L FARM IMPLEMENTS, INC.	--LOC.220
KOSLOWSKI KASUALS, INC.	--LOC.221
KOSLOWSKI HAUS, INC.	--LOC.222

EACH IS ASSIGNED ITS OWN LOCATION CODE FOR CLARITY
IN THE INTEROFFICE DIRECTORY.

Figure 2

EXTENDED TRANSLATION

Some employees of GK GLASS PRODUCTS INC. will be placing calls to Austria(43), Brazil(55), France(33), Belgium(32), Italy(39), Spain(34), and the UK(44). GK GLASS subscribes to KOS-TEL INC., an OCC which serves the UK, France, Austria, and Belgium, as well as the US and Canada.

The extended translation capability available as of Release 8 allows GK GLASS to take full advantage of KOS-TEL's services by routing calls to various countries via separate Route Lists.

Figure 3

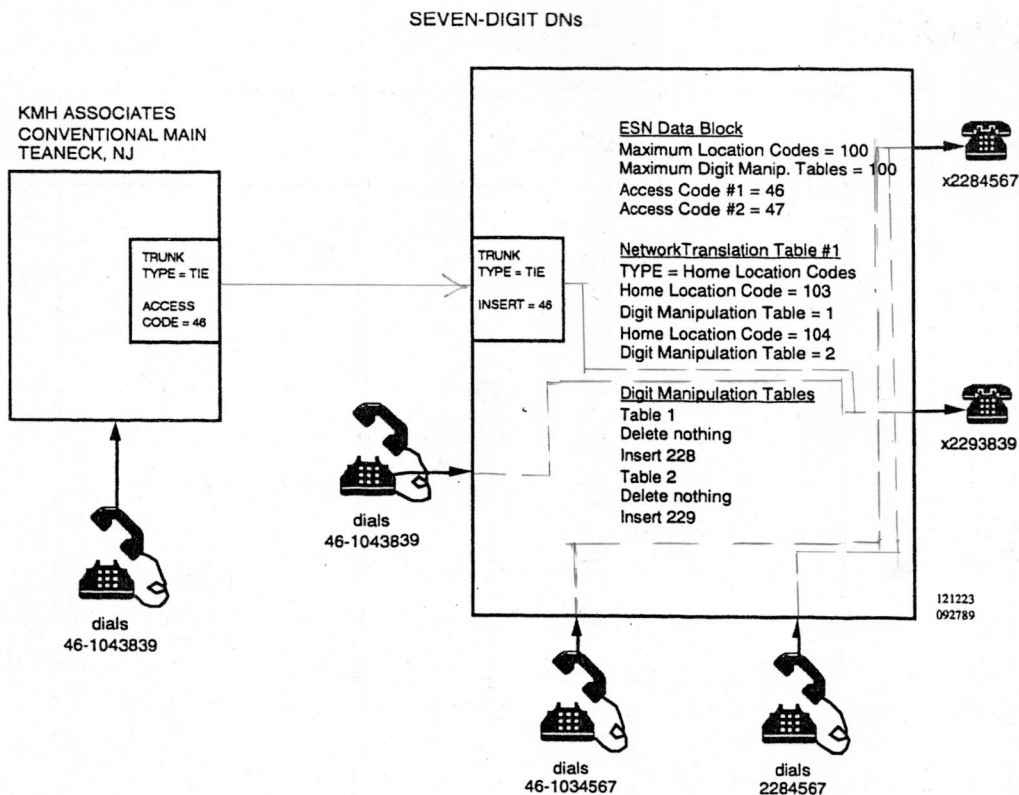
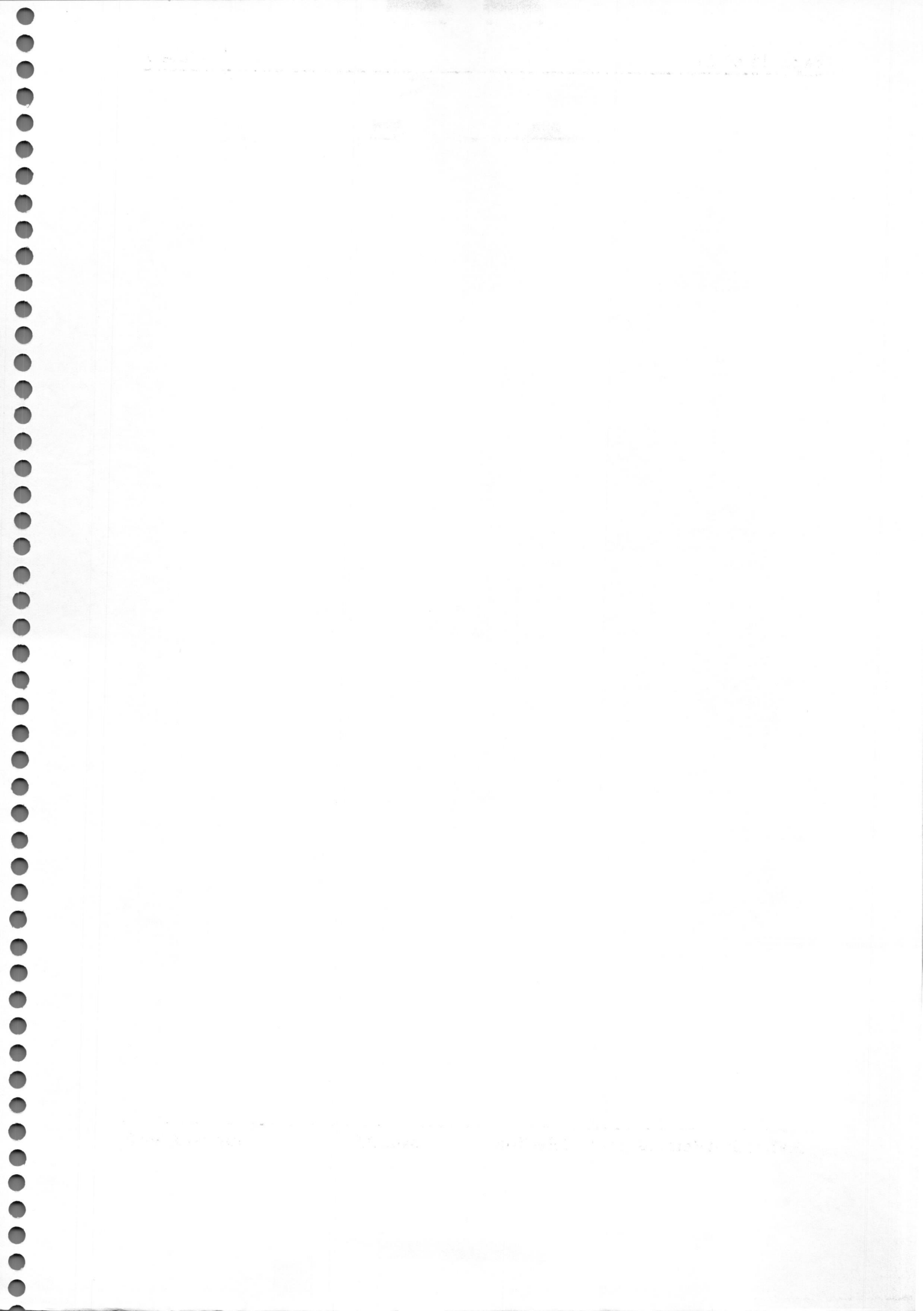
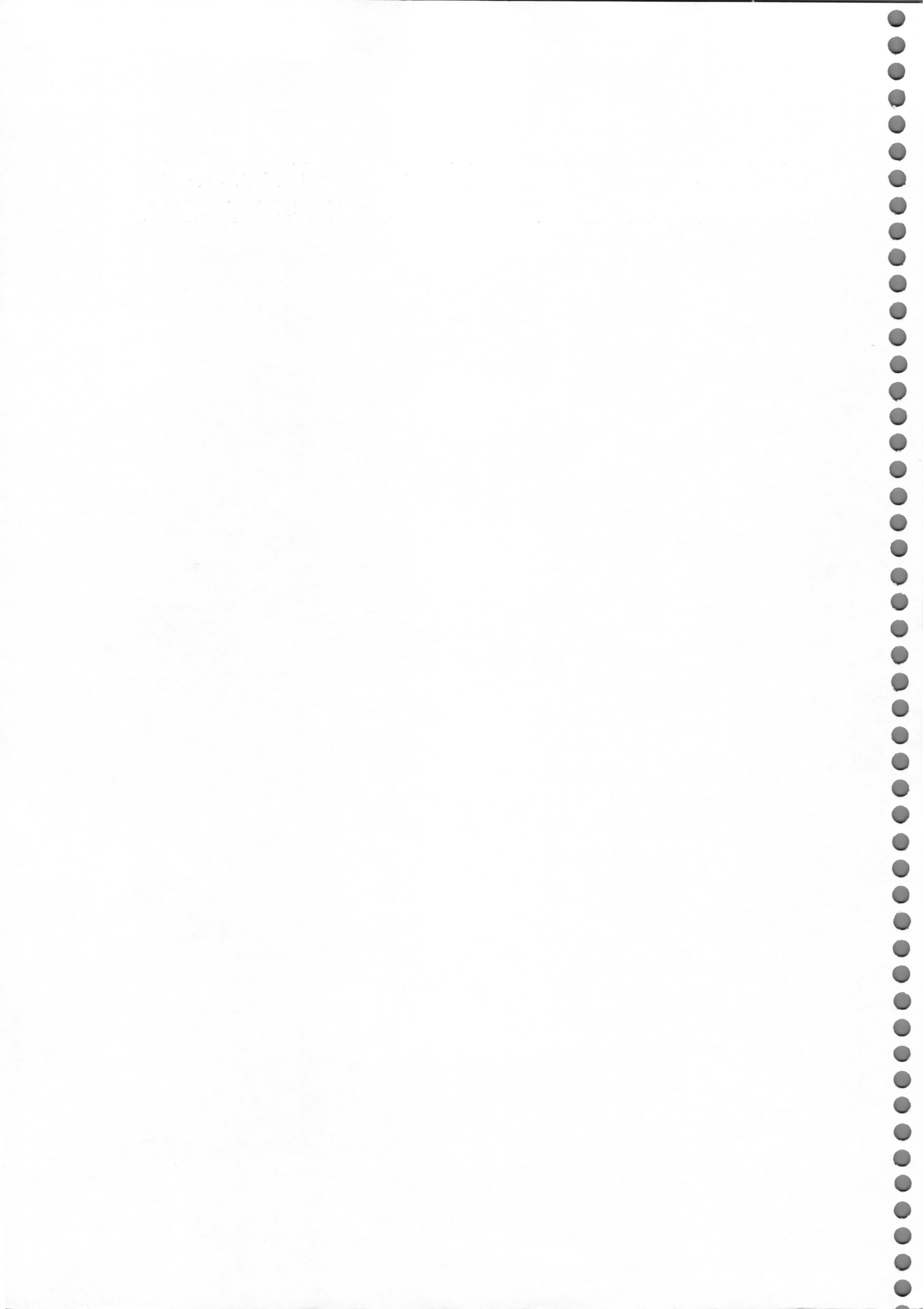


Figure 4





MODULE 6

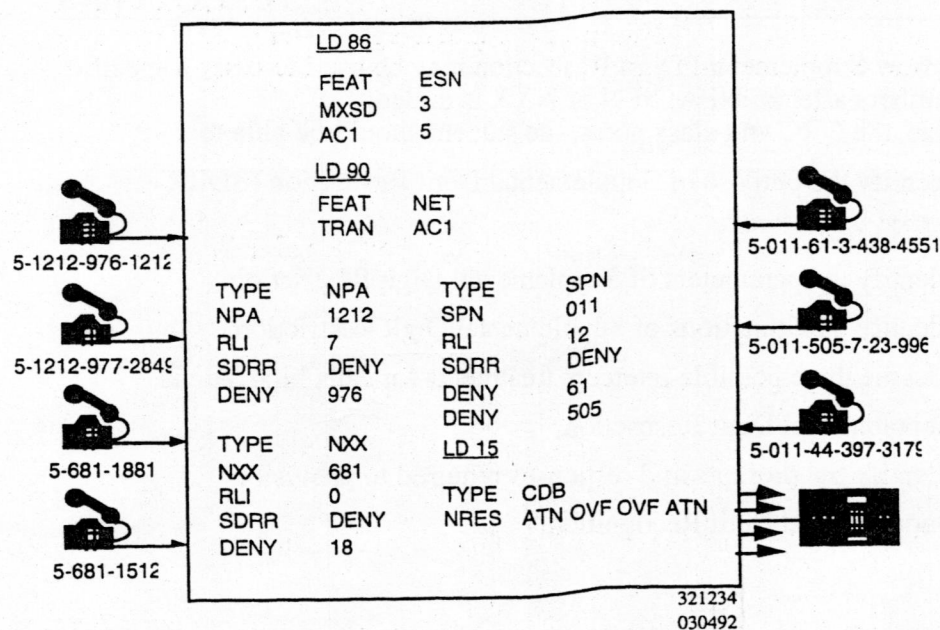
**DESCRIBING SUPPLEMENTAL
DIGIT RESTRICTION**

MODULE 6**OBJECTIVES**

This module describes how Supplemental Digit Restriction may be used to **deny** a specific number or range of numbers after an NPA, SPN or NXX is dialed.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the purpose of Supplemental Digit Restriction (SDRR DENY).
- Identify the parameters of Supplemental Digit Restriction.
- Identify the limitations of Supplemental Digit Restriction.
- List the three possible intercept treatments for calls blocked via Supplemental Digit Restriction.
- Identify the prompts and responses required to provision Supplemental Digit Recognition.



MORTON KOSLOWSKI HATS, INC. located in Dallas, Texas, would like to deny all employees the capability of calling: Dial-It numbers in New York City (1-212-976-XXXX); Bolin Hat Factory in Dallas, a competitor (DID range 681-18XX); Australia (011-61-XX...XX); and Nicaragua (011-505-XX...XX).

Figure 1

DEFINITION

The purpose of Supplemental Digit Restriction (SDRR) is to deny access to a specific telephone number or range of telephone numbers **dialed after** an NPA, NXX, or SPN. When Supplemental Digit Restriction is in effect for a specific telephone number or range of telephone numbers, access to those numbers is denied to **all** call originators.

PARAMETERS

- Supplemental Digit Restriction may be applied to an NPA, NXX or SPN.
- There may be no conflict among denied entries for one NPA, one SPN, or one NXX (i.e., entries must be leftwise unique).
- To override an SDRR entry, a call originator must directly access a trunk and bypass NARS/BARS.
- A Supplemental Digit Restriction entry for an **NPA** may be from 1 to 7 digits in length.
- A Supplemental Digit Restriction entry for an **NXX** may be from 1 to 4 digits in length.
- A supplemental digit restriction entry for an **SPN** may be from 1 to 7 digits in length.

LIMITATIONS

- 64 entries per SDRR block as of Release 5; 16 entries per SDRR block with Releases 1 through 4.
- One SDRR block per NPA, NXX, or SPN. (A block consists of all SDRR entries for a given NPA/NXX/SPN.)
- 512 SDRR blocks for a customer equipped with NARS software as of Release 5.

INTERACTIONS

If a call originator dials a digit sequence which is denied via Supplemental Digit Restriction, the user will receive one of three customer-defined intercept treatments (overflow tone, recorded announcement, or route to the attendant).



MODULE 7

**DESCRIBING SUPPLEMENTAL
DIGIT RECOGNITION**

MODULE 7

OBJECTIVES

This module describes how the Meridian 1 can **recognize** a customer's local DDD or DID numbers and route these calls internally, thus preventing the unnecessary use of trunks for an internal call.

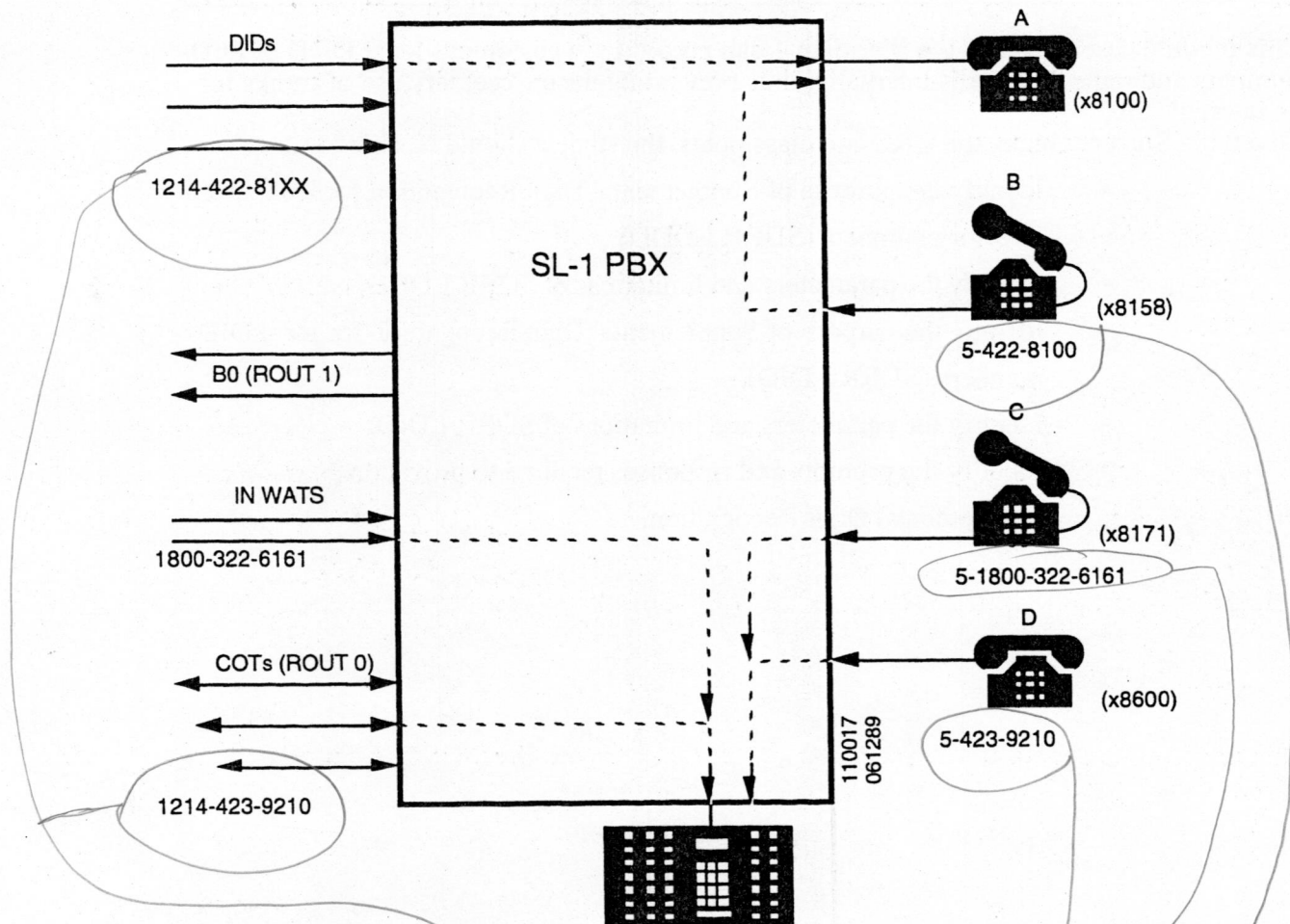
Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the purpose of Supplemental Digit Recognition for local listed directory numbers (SDRR LDDD).
- Identify the parameters and limitations of SDRR LDDD.
- Identify the purpose of Supplemental Digit Recognition for local DID numbers (SDRR LDID).
- Identify the parameters and limitations of SDRR LDID.
- Identify the prompts and responses required to provision Supplemental Digit Recognition.

MORTON KOSLOWSKI HATS, INC. (DALLAS)

NPA = 1214

AC1 = 5



Some employees at Morton Koslowski Hats, Inc. believe their internal calls will receive a prompter response if they appear to be incoming calls from the exchange network. Mr. Koslowski wishes to avoid this unnecessary use of trunk facilities.

LD 86

FEAT ESN
MXSD 7
AC1 5

LD 90

FEAT NET
TRAN AC1

TYPE NXX
NXX 422
RLI 2
SDRR LDID
LDID 81

TYPE NXX
NXX 423
RLI 2
SDRR LDDD
LDDD 9210

TYPE NPA
NPA 1214
RLI 1
SDRR LDID
LDID 42281
SDRR LDDD
LDDD 4239210

TYPE SPN
SPN 1800
RLI 2
SDRR LDDD
LDDD 3226161

LD 86

FEAT RLB

RLI 1

ENTR 0
ROUT 1
ENTR 1
ROUT 0

RLI 2
ENTR 0
ROUT 0

Figure 1

DEFINITION

The purpose of Supplemental Digit Recognition (SDRR) is to recognize listed directory numbers or DID numbers that terminate at the local switch (the switch that is performing the call routing). Once these numbers are recognized, the system will terminate the call at a station if a DID number was dialed, and at the attendant if a listed directory number was dialed. This feature will eliminate the unnecessary use of trunks for an internal call.

LDDD DEFINITION

The purpose of LDDD is to recognize public telephone numbers that normally terminate at the local attendant. Once the numbers are recognized, the system will not seize an outgoing trunk, but will delete the entire number dialed and replace it with the attendant DN. The call remains internal.

LDID DEFINITION

The purpose of LDID is to recognize public DID numbers that normally terminate at a local station. Once these numbers are recognized, the system will not seize an outgoing trunk, but will delete all but the last four digits dialed and dial the internal DN for the station user. The call remains internal. With Release 13+ and the DN expansion OPT 150, Digit Manipulation may be applied to allow an internal DN of more than 4 digits.

LIMITATIONS

One SDRR block per NPA, SPN or NXX. Sixty four entries per SDRR block. 512 SDRR blocks for a customer with NARS software.

PARAMETERS

- There are two types of supplemental digit recognition:
 - Local DDD numbers (LDDD)
 - Local DID numbers (LDID)
- LDDD is used to recognize a customer's public telephone numbers that terminate at the attendant.
- LDID is used to recognize a customer's public telephone numbers that terminate at a station (DID numbers).
- LDDD/LDID may be applied to an NPA, NXX, or SPN.
- LDDD and LDID use SDRR blocks.
- Switch must be equipped with X11 software, Release 5+.
- There may be no conflict among recognized entries for an NPA, NXX, or SPN (i.e.; entries must be leftwise unique).
- An LDDD or LDID entry for an NPA may be from one to seven digits.
- An LDDD or LDID entry for an NXX may be from one to four digits.
- An LDDD or LDID entry for an SPN may be from one to seven digits.
- To bypass LDDD or LDID, a station user must directly access a trunk and circumvent NARS/BARS.
- One SDRR block per NPA, SPN or NXX.
- 64 entries per SDRR block.
- 512 SDRR blocks for a customer equipped with NARS software.



MODULE 8

**DESCRIBING OFF-NET
NUMBER RECOGNITION**

MODULE 8

OBJECTIVES

Off-Net Number Recognition eliminates the unnecessary use of extra trunks when a subscriber using the private network dials a DID or listed directory number that terminates at an **ESN (on-net) location**. This module describes the purpose and parameters of Off-Net Number Recognition.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of Off-Net Number Recognition.
- Identify the limitations of Off-Net Number Recognition.
- Identify the parameters of Off-Net Number Recognition.
- Identify the prompts and responses required to provision Off-Net Recognition.

- User dials 7-1518-691-0481. If a trunk in Route 10 (Entry 0) is used, system outputs: 8-691-0481
- User dials 7-1518-267-7376. If a trunk in Route 10 (Entry 0) is used, system outputs: 7376
- User dials 7-1617-422-9878. If a trunk in Route 11 (Entry 0) is used, system outputs: 8-422-9878
- User dials 7-1617-216-1600. If a trunk in Route 11 (Entry 0) is used, system outputs: 0

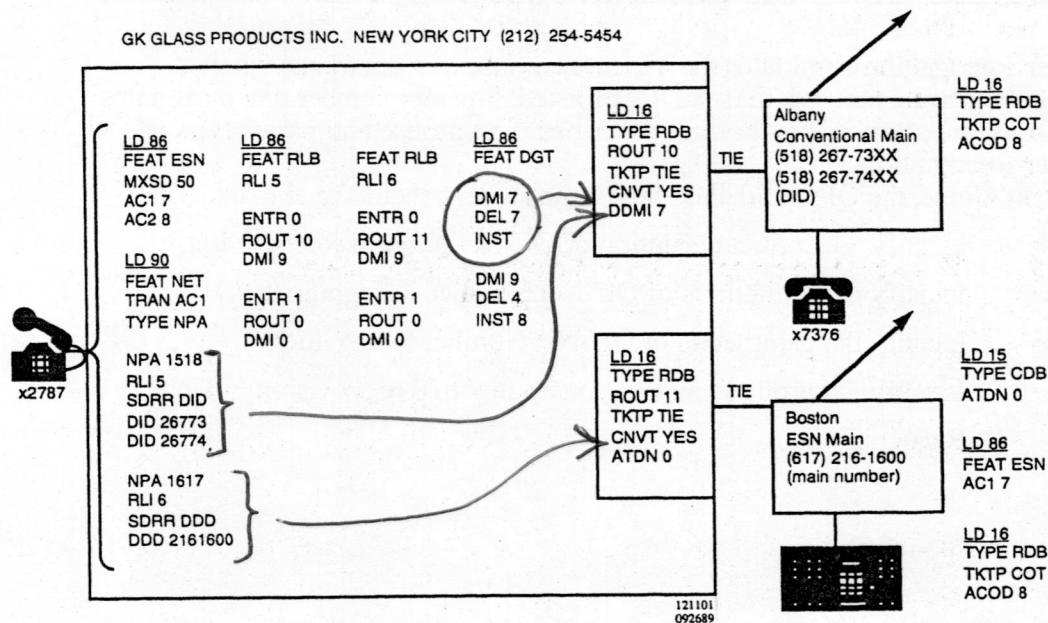


Figure 1

OFF-NET NUMBER RECOGNITION DEFINITION

Off-Net number Recognition eliminates the unnecessary use of extra trunks when a subscriber using the private network dials a DID or listed directory number that terminates at an **ESN (on-net) location**. Calls are routed directly to the dialed DN (DID calls) or to the listed directory number (DDD calls), rather than being switched from the terminating ESN switch to the CO and back again.

PARAMETERS

- There are two types of Off-Net Number Recognition:
 - Remote listed directory numbers (DDD)
 - Remote DID numbers (DID)
- DDD is used to recognize a network switch's public numbers that terminate at an attendant.
- DID is used to recognize a network switch's DID numbers (public numbers that terminate at a station).
- DDD/DID may be applied to an NPA, NXX, or SPN.
- DID and DDD use SDRR blocks.
- Switch must be equipped with X11 software, Releases 5+.
- Applies to outgoing calls routed via **tie trunks only**.
- There cannot be any conflict among recognized numbers.
- A DDD/DID entry for an NPA may be from one to seven digits.
- A DDD/DID entry for an NXX may be from one to four digits.
- A DDD/DID entry for an SPN may be from one to seven digits.

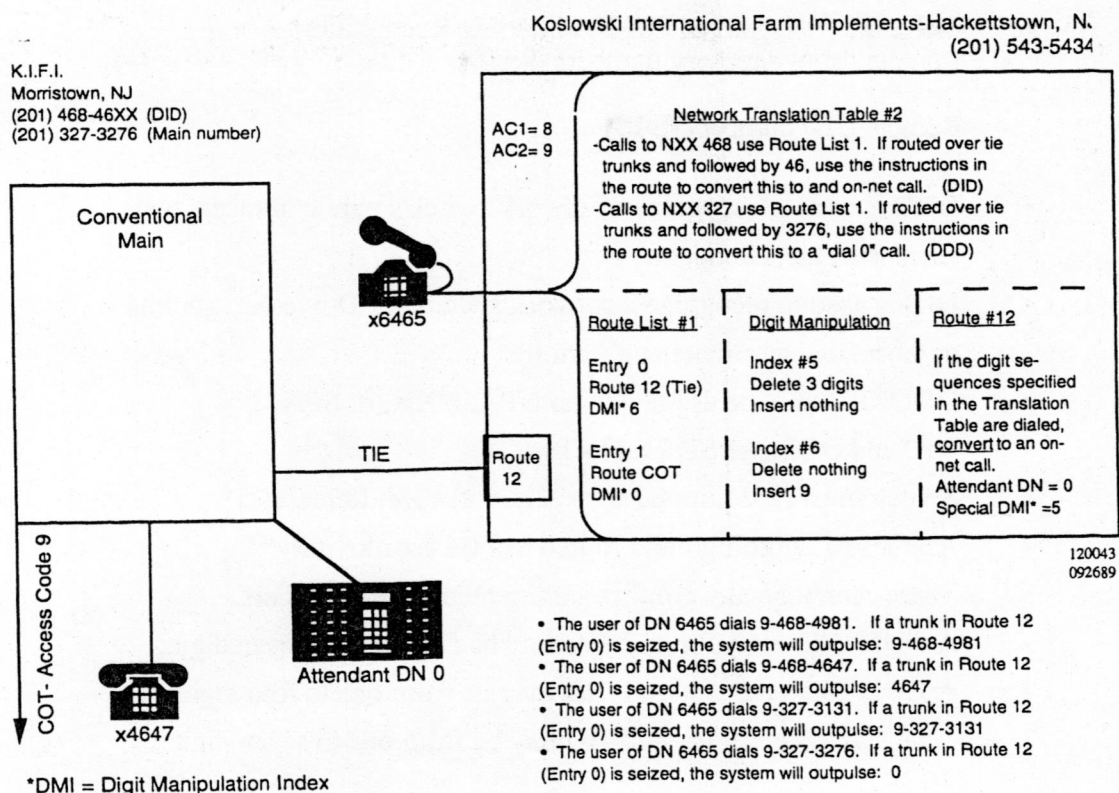


Figure 2

DDD DEFINITION

The purpose of SDRR DDD is to recognize public telephone numbers that normally terminate at a remote attendant when routed via a **tie trunk** to a network switch. Once the numbers are recognized, the system will output the attendant DN of the remote switch rather than the access code (to the COTs) at that switch and the public number.

DID DEFINITION

The purpose of SDRR DID is to recognize public DID numbers that normally terminate at a remote station when routed via a **tie trunk**. Once the numbers are recognized, the system will output the station's directory number rather than the access code (to the COTs) and the public DID number.

LIMITATIONS

- One SDRR block per NPA, NXX, or SPN.
- 64 entries per SDRR block.
- 512 SDRR blocks per customer equipped with NARS.



MODULE 9

**DESCRIBING INCOMING
TRUNK GROUP EXCLUSION
(NARS)**

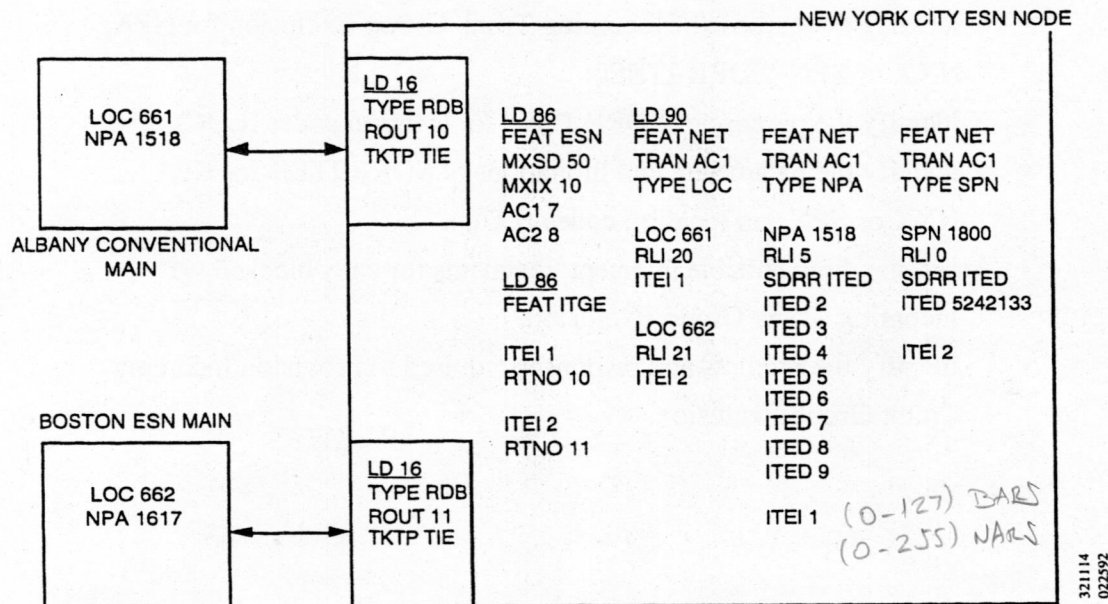
MODULE 9

OBJECTIVES

This module describes how the Meridian 1 denies specific digit sequences to incoming TIE callers attempting to make tandem trunk connections.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the purpose of Incoming Trunk Group Exclusion for NPA, NXX or SPN (SDRR ITED).
- Identify the purpose of SDRR ITED for location codes (LOC).
- Identify the parameters and limitations of SDRR ITED for NPA, NXX or SPN and location codes (LOC).
- List the three possible intercept treatments for calls blocked via Incoming Trunk Group Exclusion.
- Identify the prompts and responses required to provision Incoming Trunk Group Exclusion.



The president of GK Glass Products Inc. wishes to deny incoming callers to his Node in New York City from his mains in Albany and Boston the ability to dial the following numbers: their own location codes (661 for Albany and 662 for Boston); for Albany only, anything within its own NPA (1518); and for Boston only, its own toll-free number (1800-524-2133).

Figure 1

DEFINITION

Incoming Trunk Group Exclusion allows a customer to define restricted dialing sequences following an NPA, NXX or SPN and to deny the ability to dial designated Location Codes when the call is incoming from specific TIE routes.

The restricted dialing sequences are listed in the Network Translation Table (SDRR ITED) and the restricted TIE routes are listed in an Incoming Trunk Group Exclusion Index (ITGE).

PARAMETERS (NPA, NXX, & SPN)

- May be applied to an NPA, NXX, SPN, or LOC.
- Incoming Trunk Group Exclusion Index 0 is reserved by system to indicate that no Incoming Trunk Group Exclusion is required.
- Switch must be equipped with X11 software, Release 5+.
- Uses SDRR blocks.
- One to seven digits may be denied per entry for NPAs.
- One to four digits may be denied per entry for NXXs.
- One to seven digits may be denied per entry for SPNs.

LIMITATIONS (NPA, NXX, & SPN)

- 64 entries per NPA, NXX, or SPN.
- One SDRR block per NPA, NXX, or SPN.
- 512 SDRR blocks per customer. (1500)
- Incoming Trunk Group Exclusion digits cannot conflict with any other SDRR entries for an NPA, NXX, or SPN.
- Maximum number of Incoming Trunk Group Exclusion Indexes is 256 (#0-255). NARS 128 (#0-127) BARS
- Only one Incoming Trunk Group Exclusion Index may be referenced per NPA, NXX, or SPN.
- A maximum of 512 trunk routes may be referenced per Incoming Trunk Group Exclusion Index. (0-511)

INCOMING TRUNK GROUP EXCLUSION WITH LOCATION CODE PURPOSE

Prevents a call originator at a network switch from accessing the NARS software at the Node and dialing designated location codes.

INCOMING TRUNK GROUP EXCLUSION WITH LOCATION CODE PARAMETERS

- Uses SDRR blocks.
- One Incoming Trunk Group Index may be referenced per Location Code.
- One SDRR block per Location Code.

FEATURE INTERACTIONS

If an incoming TIE call is blocked via Incoming Trunk Group Exclusion, the user will receive one of three customer-defined intercept treatments (overflow tone, recorded announcement, or route to the attendant).



MODULE 10

**DESCRIBING AUTOMATIC
ON-NET TO OFF-NET
OVERFLOW**

MODULE 10**OBJECTIVES**

If all tie trunk facilities to a Network location are unavailable, NARS can convert an on-net number (LOC+DN) to an off-net number and use off-net facilities to complete the call.

This module describes the Automatic On-net to Off-net Overflow feature.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of Automatic On-net to Off-net Overflow.
- Identify the limitations of Automatic On-net to Off-net Overflow.
- Identify the parameters of Automatic On-net to Off-net Overflow.
- Identify the prompts and responses required to provision Automatic On-Net to Off-Net Overflow.

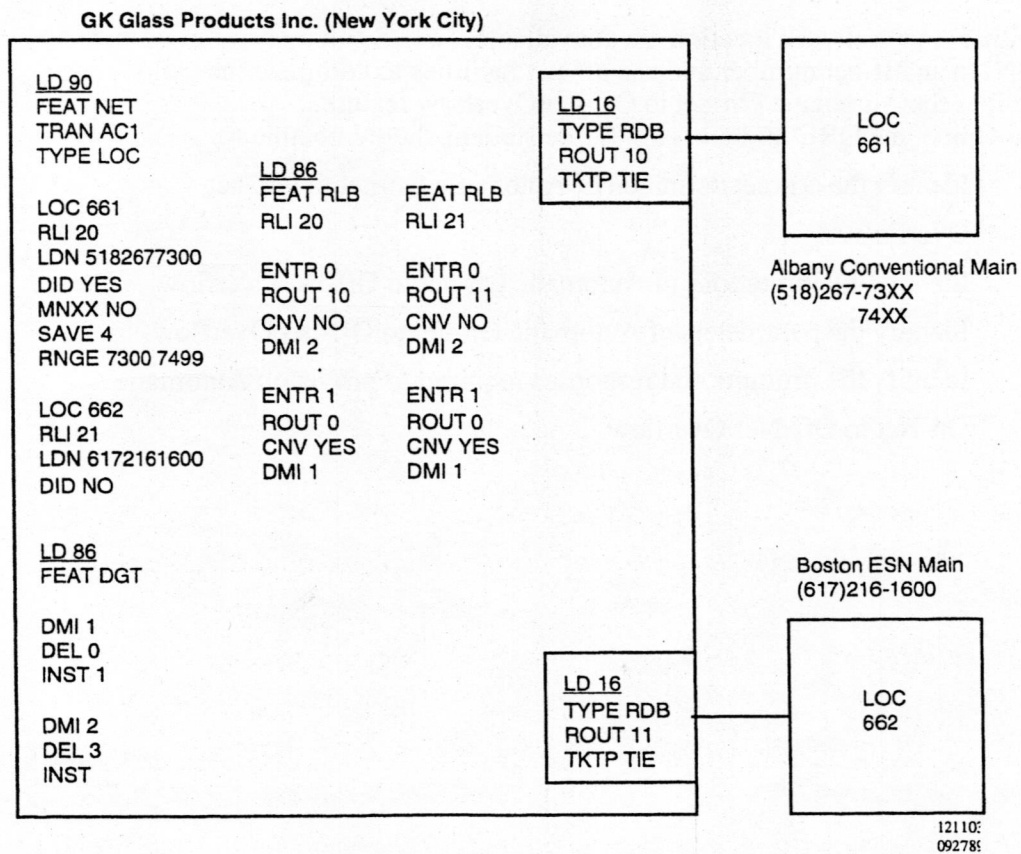


Figure 1

DEFINITION

If all on-net facilities (TIE trunks) to a location are unavailable, NARS can convert a dialed UDP number (AC1+LOC+DN) to a listed directory number or DID number at that location and use off-net facilities to complete the call.

PARAMETERS

- Applies to Location Code translation only.
- Only one listed directory number may be defined per location code (LOC).
- Multiple NXX codes may be defined (Rls. 5+).
- Multiple ranges of DNs within each NXX may be defined (Rls. 5+).

LIMITATIONS

- Only one NPA per Location Code is allowed.
- Ranges defined within a Location Code must be unique. Overlapping or duplication of ranges is not permitted.
- The number of digits in each DID range may be one to four.
- A maximum of twenty DID ranges may be defined per Location Code, regardless of the number of office codes.



MODULE 11

**DESCRIBING
NETWORK SPEED CALL**

MODULE 11

OBJECTIVES

The Network Speed Call (NSC) feature enables a call originator who is normally restricted from making certain types of NARS calls to make such calls if the destination is a company-approved number defined in a **System** Speed Call list. This module describes the purpose and parameters of the Network Speed Call feature.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of Network Speed Call.
- Identify steps required to place a Network Speed Call.
- Identify parameters and limitations of Network Speed Call.
- Identify the prompts and responses required to provision Network Speed Call.

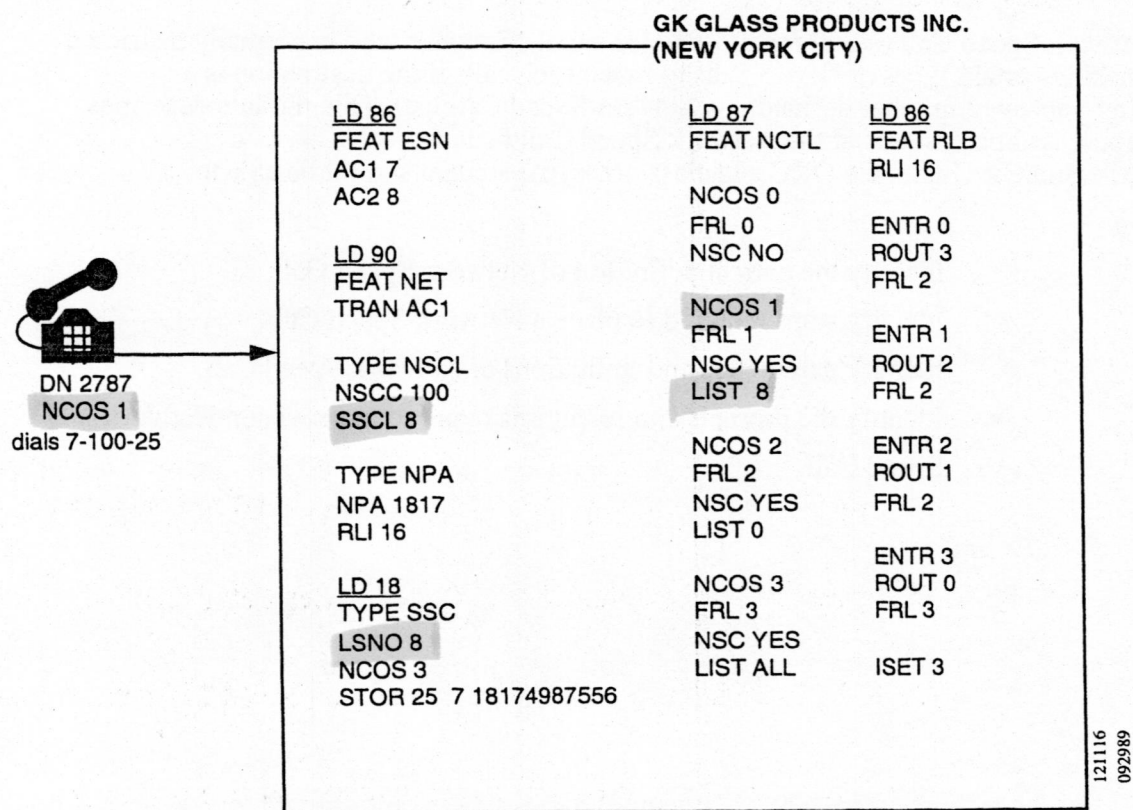


Figure 1

DEFINITION

The Network Speed Call feature enables a call originator who is normally restricted from making certain types of NARS calls to make such calls if the destination is a company-approved number defined in a System Speed Call list.

PARAMETERS

- System Speed Call (SSC) package must be equipped.
- Network Speed Call (NSC) package must be equipped.
- Access to Network Speed Call feature is allowed after NARS/BARS access code is dialed.
- Network Speed Call Access Code may be one to three digits in length.
- NSC access code is associated with a System Speed Call list.
- An NCOS number is associated with each System Speed Call list.
- **The NCOS assigned to each speed call list is used during a call if the FRL associated with the NCOS of SSC list is higher than the FRL of the originator's NCOS.**
 - The system examines the user's NCOS/FRL
 - The system examines the NCOS/FRL of the SSC
 - The system will use the higher FRL

LIMITATIONS

- System Speed Call list access codes may not conflict with any other NXXs, NPAs, SPNs, or LOCs codes assigned in the same translation table.
- 4096 (Rls. 13+) System Speed Call lists per system.

DIALING FORMAT

AC1+LA+EN

LA = List Access code

EN = Entry Number (entry number on System Speed Call list)



MODULE 12

**DESCRIBING AUTOMATIC
LEAST COST ROUTING**

MODULE 12**OBJECTIVES**

This module describes Automatic Least Cost Routing. For each call that passes Network Translation in the Meridian 1, the NARS software will select a route from a list of up to sixty-four outgoing alternate routes to complete a call.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the purpose of Route Lists.
- Identify the parameters and limitations of Route Lists.
- Identify how the system searches a Route List for an idle trunk.
- State the function of the Initial Set.
- Identify the correct definition of Expensive Route Warning Tone.
- Identify the three types of intercept treatment a user may receive if unable to complete a call via a Route List.
- Identify the prompts and responses required to provision Route List Indexes and Expensive Route Warning Tone.

275011
051689

[illegible]

Figure 1

BUILDING ROUTE LISTS

For a network to be most cost-effective, one Route List must be created for each type of call the customer makes.

A four-step process may be used to determine the appropriate number of Route Lists required:

- List the trunk routes the customer has by route number, type of trunk route, and calling area served by that route (or requested by the customer).
- List the various types of calls the customer will make (e.g. local, international, intrastate). Group calls by similarity of facilities to be used and eligibility of personnel groups to place these calls.
- For every call type listed, identify each trunk route that may be used to process calls. In order of search, assign a Route List entry number to each trunk route.
- Assign a Route List Index number to each type of call.

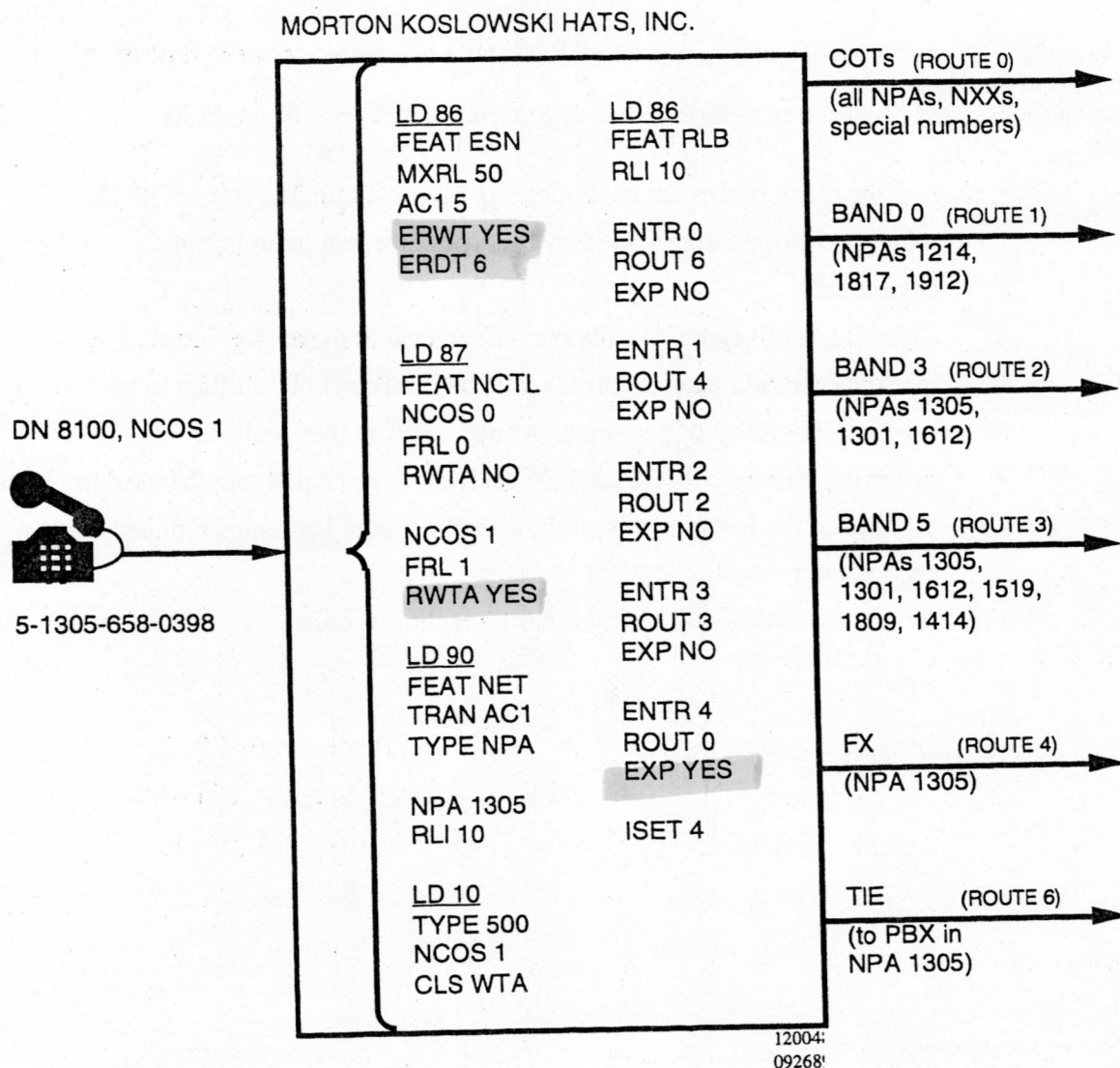


Figure 2

DEFINITION

Automatic least cost routing is the method by which NARS automatically routes a call over the most cost-effective route available (per the data base).

For each call that passes Network Translation NARS selects a route from a list of up to sixty-four outgoing alternate routes to complete a call. A list of routes over which calls to a **particular destination** may be completed is called a Route List. Each route referenced in a list is called an entry.

Any combination of trunks types may be specified in a Route List. The first entries in a Route List are typically the "least-cost" routes to a destination and comprise the "Initial Set" (ISET). The last entries in the list are typically less cost-effective and comprise the "Extended Set" (ESET).

NARS always searches a Route List beginning at entry 0 and ending at the last entry in the Route List.

PARAMETERS

Associated with each Route List are:

- The Route List index number (0-255 NARS,)
- The number of entries in the Route List that comprise the ISET.
- The Minimum Facility Restriction Level (MFRL) required before a user is not prompted for an Authorization Code (NAUT package only).

Associated with each entry in a Route List are:

- The entry number (0-63).
- Is this call going to terminate locally? (Internally)
- The route number (0-30, 32-127; 0-511¹⁴⁺).
- The time(s) of day the route may be accessed.
- Information for conversion from on-net to off-net calls (NARS only).
- Whether or not the entry is qualified as expensive.
- The lowest Facility Restriction Level (FRL) required for access.
- The Digit Manipulation index (0-255) to be referenced.
- The Free Calling Area Screening index (0-255 with NARS) to be referenced.
- Whether or not Off-Hook Queuing (OHQ) is allowed.
- Whether or not Call-Back Queuing (CBQ) is allowed.

LIMITATIONS

- Maximum of 64 entries per Route List (# 0-63).
- Maximum of 256 Route Lists per customer with NARS (# 0-255).

ISSET DEFINITION

- The entries in a Route List over which the system will attempt to complete a call before checking for OHQ or CBQ eligibility.
- Typically, these entries are considered inexpensive.

ISSET PARAMETERS

- Entries in a Route List should be listed in order of search. (Typically from least expensive to most expensive -- exceptions might be made for such factors as transmission quality when sending data.)
- All entries that are not part of the ISET are called the Extended Set (ESET). (There is a procedure called "declaring the ISET." After declaring the ISET, the remaining entries automatically become the ESET.)

EXPENSIVE ROUTE WARNING TONE DEFINITION

The Expensive Route Warning Tone alerts the caller that an expensive route has been selected to complete the call, and provides the caller with the option of either accepting, aborting, or depressing the Ring Again Key and entering the Call Back Queue (if equipped) for inexpensive entries. Expensive Route Warning Tone is three bursts of tone.

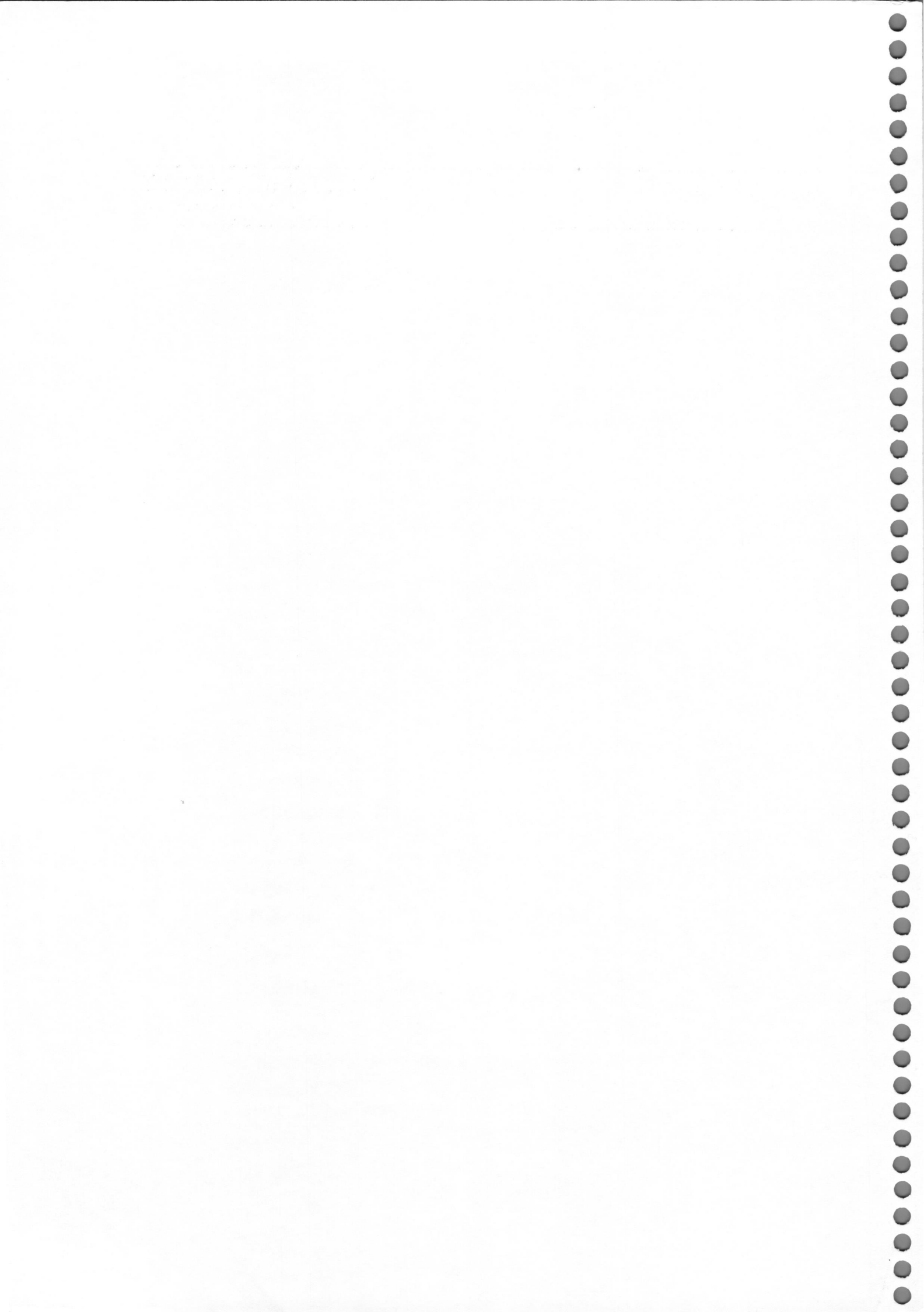
EXPENSIVE ROUTE WARNING TONE PARAMETERS

In order to provide a call originator with Expensive Route Warning Tone, all four of the following criteria must be met:

- Expensive Route Warning Tone must be enabled for the customer.
- Expensive Route Warning Tone must be enabled for the call originator's Network Class of Service (NCOS).
- The entry the system has chosen for this call must be in the ESET.
- The entry the system has chosen for this call must be classified as expensive.

If any one of the criteria is not met, the call will complete via the entry chosen **without** Expensive Route Warning Tone.





MODULE 13

**DESCRIBING TIME OF
DAY SCHEDULES**

MODULE 13

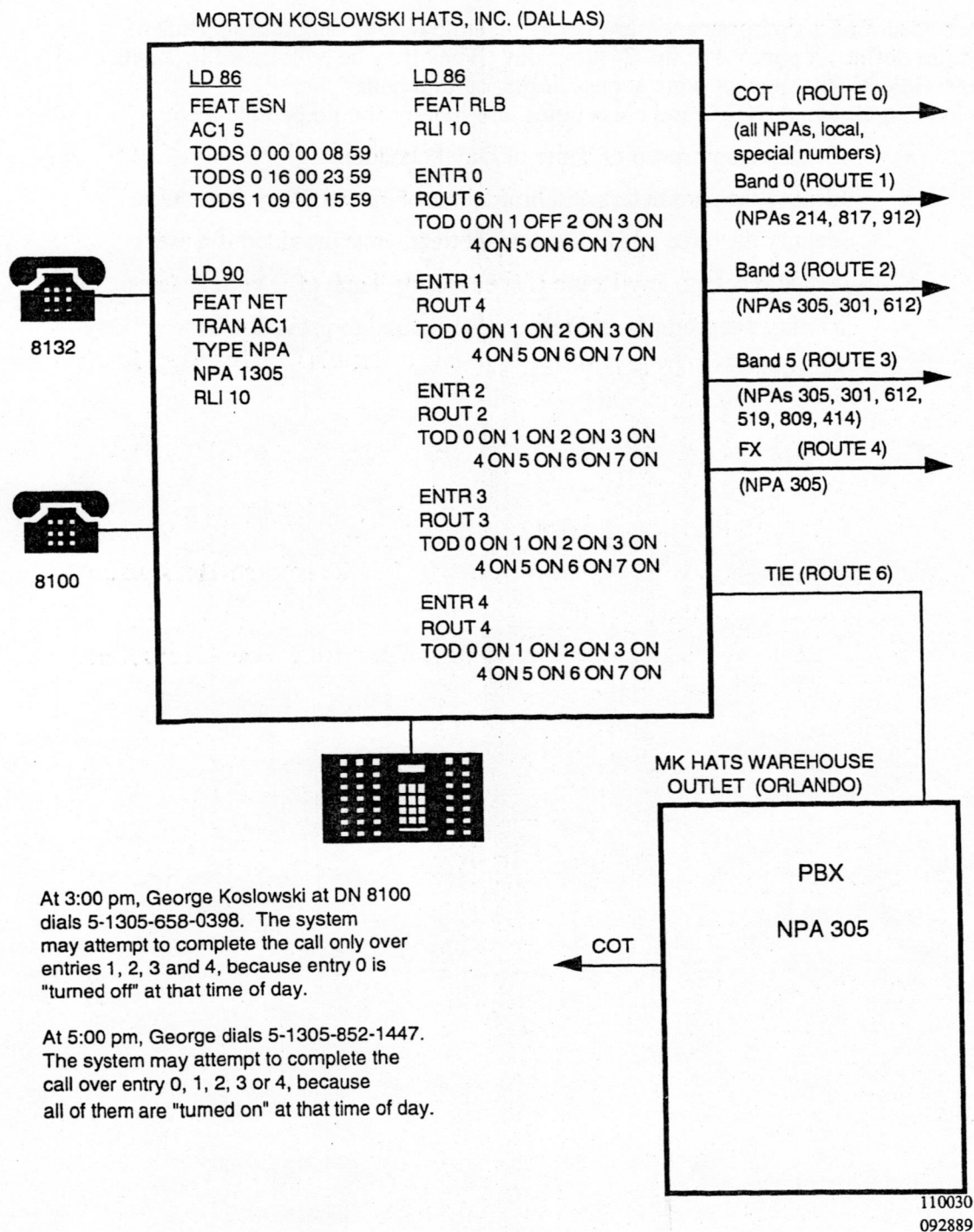
OBJECTIVES

This module describes the purpose and parameters of Time of Day Schedules. Time of Day Schedules define all portions of the 24-hour day. They may be referenced by Route List entries to selectively allow or deny access during certain hours.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the purpose of Time of Day Schedules.
- Identify the parameters and limitations of Time of Day Schedules.
- Identify the three possible intercept treatments provided if a user is denied access to any Route List entries by Time of Day Schedules.
- Identify the prompts and responses required to provision Time of Day Schedules.

Due to the amount of traffic on the COTs at the Orlando location (NPA 305) between the hours of 9:00 am and 4:00 pm, the telecommunications manager at Morton Koslowski Hats Inc. in Dallas wishes to prevent calls to the 305 NPA from being processed through the PBX in Orlando via the tie trunks.



At 3:00 pm, George Koslowski at DN 8100 dials 5-1305-658-0398. The system may attempt to complete the call only over entries 1, 2, 3 and 4, because entry 0 is "turned off" at that time of day.

At 5:00 pm, George dials 5-1305-852-1447. The system may attempt to complete the call over entry 0, 1, 2, 3 or 4, because all of them are "turned on" at that time of day.

Figure 1

DEFINITION

NARS provides up to eight (# 0-7) Time-of-Day (TOD) schedules. Each entry in a Route List references the TOD schedules specifying the hours during which the entry may and may not be accessed. Thus, based upon the current time of day, the most cost-effective route alternatives may be selected.

PARAMETERS

- There may be a maximum of eight Time-of-Day Schedules (# 0-7).
- Each schedule specifies a period or periods of a 24-hour day.
- All periods of a 24-hour day are included in the TOD schedules.
- Any time period not defined in TOD schedules 1 to 7 automatically appears in TOD schedule 0.
- The shortest time period that may be contained in any TOD schedule is fifteen minutes.
- The same period of time may not be assigned to more than one TOD schedule.
- TOD schedules are based on a 24-hour clock.
- Midnight (00 00) is considered the "start" of the day and 11:59 p.m. (23 59) is the "end" of the day.
- The end time of a given TOD schedule must be later than the start time of that schedule.

TIME OF DAY SCHEDULES FORMAT

The input format for Time of Day Schedules is divided into five fields:
s aa bb cc dd

- s - This field represents the TOD Schedule number. TOD Schedules may be numbered 0 through 7.
- aa - The hour that the TOD Schedule begins. The start hour may range from 00 to 23.
- bb - The minute the TOD Schedule begins. The four possible start minutes are 00, 15, 30 and 45.
- cc - The hour the TOD Schedule ends. The end hour may range from 00 to 23.
- dd - The minute the TOD Schedule ends. The four possible end minutes are 14, 29, 44 and 59.

TOD CHARACTERISTICS

Overlapping Schedules

If a new schedule includes any intervals included in an earlier schedule, the older schedule's end time automatically adjusts so that it ends one minute before the following schedule begins.
Start times of both schedules remain unchanged.

Start Minute

Valid start minutes are 00, 15, 30 and 45.
Invalid start minute force-corrected to next earlier valid start minute.

End Minute

Valid end minutes are 14, 29, 44 and 59.
Invalid end minute force-corrected to next later valid end minute.

TODS 0

Any period of the 24-hour day not defined in TOD Schedules 1 through 7 defaults to TODS 0.

INTERACTIONS

If a call originator is denied access to all entries in a Route List via TOD schedules, the user will receive one of three customer-defined intercept treatments (overflow tone, recorded announcement, or route to the attendant).



MODULE 14

**DESCRIBING
DIGIT MANIPULATION**

MODULE 14**OBJECTIVES**

Sometimes the number dialed by a call originator is not acceptable for the trunk type over which the call is to be routed. This module describes how Digit Manipulation tables are used to insert or delete digits to change the dialed number to a number that is acceptable. Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of Digit Manipulation.
- Identify the purpose of Digit Manipulation tables.
- Identify the parameters and limitations of Digit Manipulation tables.
- Identify the prompts and responses required to provision Digit Manipulation.

George Koslowski at DN 8100 dials 5-1-305-658-0398.

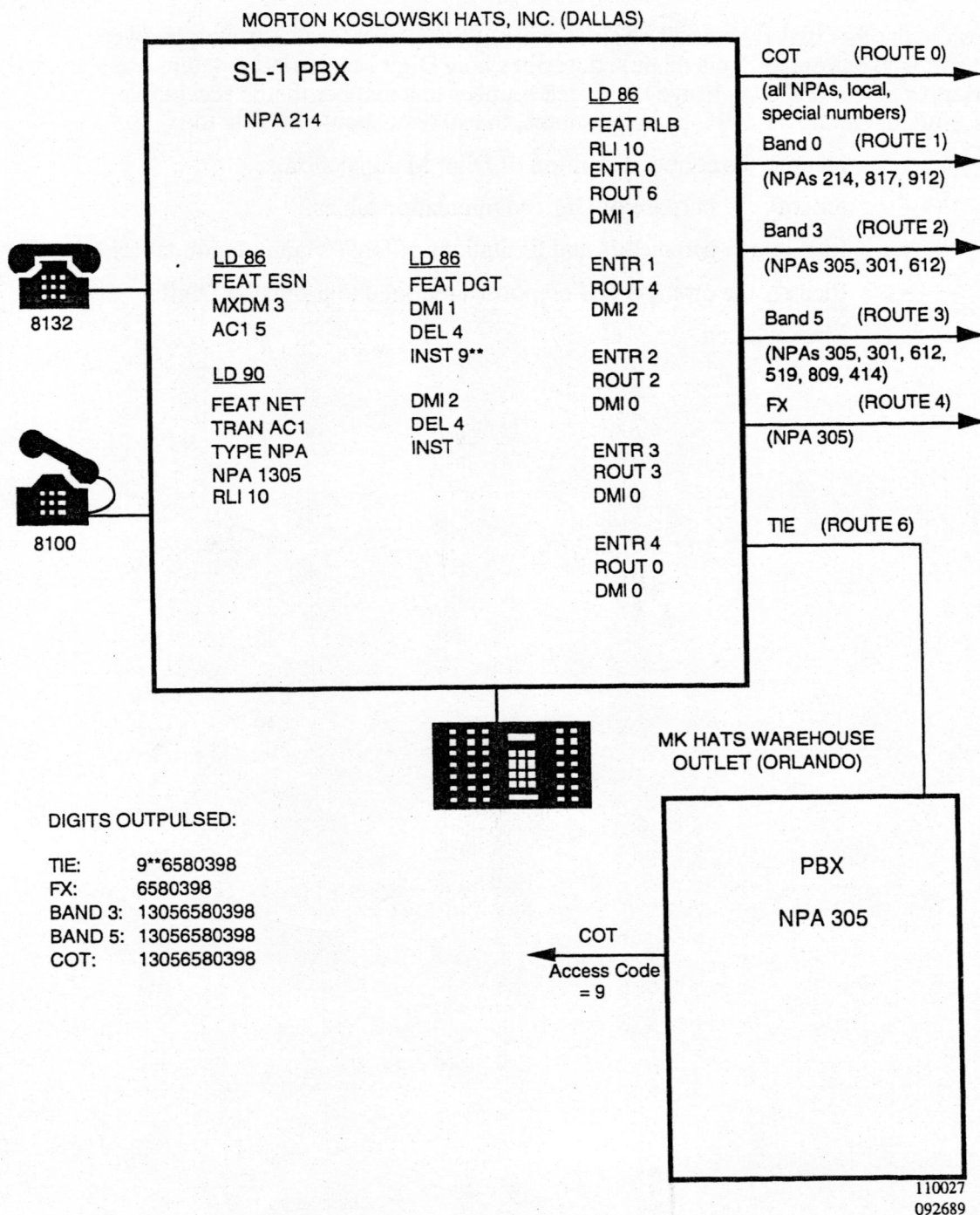


Figure 1

DEFINITION

A combination of trunk types with different dialing requirements may be referenced by a single Route List. However, when certain trunks are accessed, the digits dialed by the call originator must be manipulated to conform to the dialing requirements of the trunk types. NARS uses Digit Manipulation tables to modify the dialed digits, producing a number acceptable to the facility over which the call is to be routed.

PARAMETERS

- Digit Manipulation tables are referenced by each entry in a Route List.
- Only one Digit Manipulation table may be referenced per entry.
- Digits may be deleted and/or inserted.
- The system will delete digits first, then insert digits.
- Inserting an * will cause the system to pause 3 seconds before outputting any other digits.

LIMITATIONS

- Maximum number of Digit Manipulation tables is 256 (# 0-255).
- NARS reserves Digit Manipulation table 0 to indicate no Digit Manipulation is required by an entry.
- Maximum number of leading digits that may be deleted is 15.
- Maximum number of **actual** leading digits that may be inserted is 24 as of Release 5.
- A maximum of three * may be inserted at one time.

MODULE 15

**DESCRIBING FREE CALLING
AREA SCREENING**

MODULE 15**OBJECTIVES**

In contrast to Supplemental Digit Restriction, which denies specific digits sequences to all call originators at all times, the Free Calling Area Screening (FCAS) feature allows or denies specific NXXs per NPA for individual Route List entries. This module describes how the FCAS feature can be used to deny specific NXXs, after an NPA is dialed, on one Route List entry while allowing those NXXs on another Route List entry.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of FCAS.
- Identify the parameters and limitations of FCAS.
- List three reasons for using the FCAS feature.
- Identify three intercept treatments provided if the user is denied access to all Route List entries via the FCAS feature.
- Identify the prompts and responses required to provision FCAS tables.

George Koslowski at DN 8100 dials 5-1305-658-0398. The TIE and FX facilities will function most cost effectively if only used to serve NXXs 321, 396, 441, 539 and 661 within the 305 NPA (NXXs local to the PBX in Orlando).

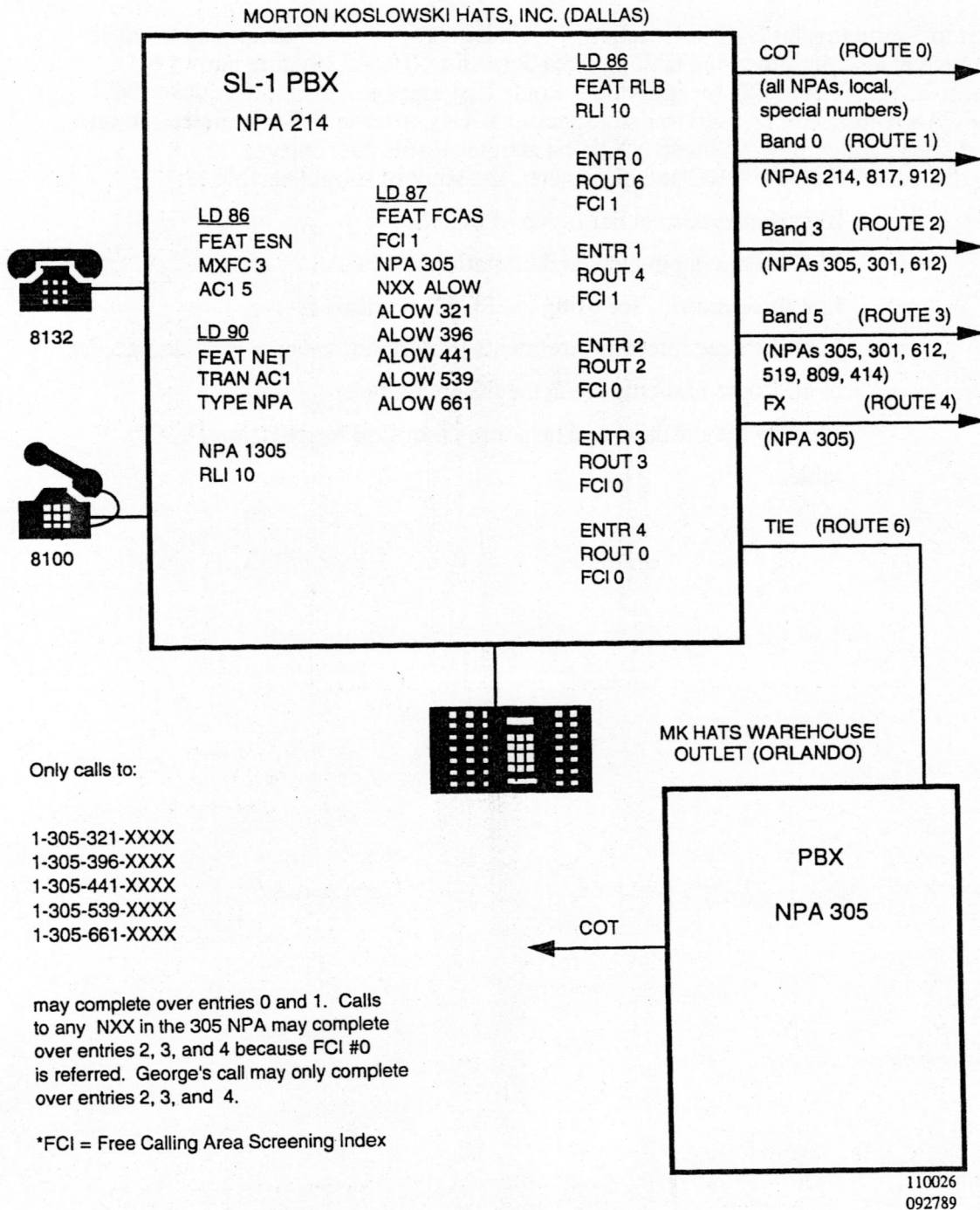


Figure 1

Mr. Morton Koslowski, president of Morton Koslowski Hats Inc., wishes to route directory-assistance (AC1+NPA+555-1212) calls over COTs only to increase the possibility that more expensive, time consuming calls will be routed over more cost-effective facilities.

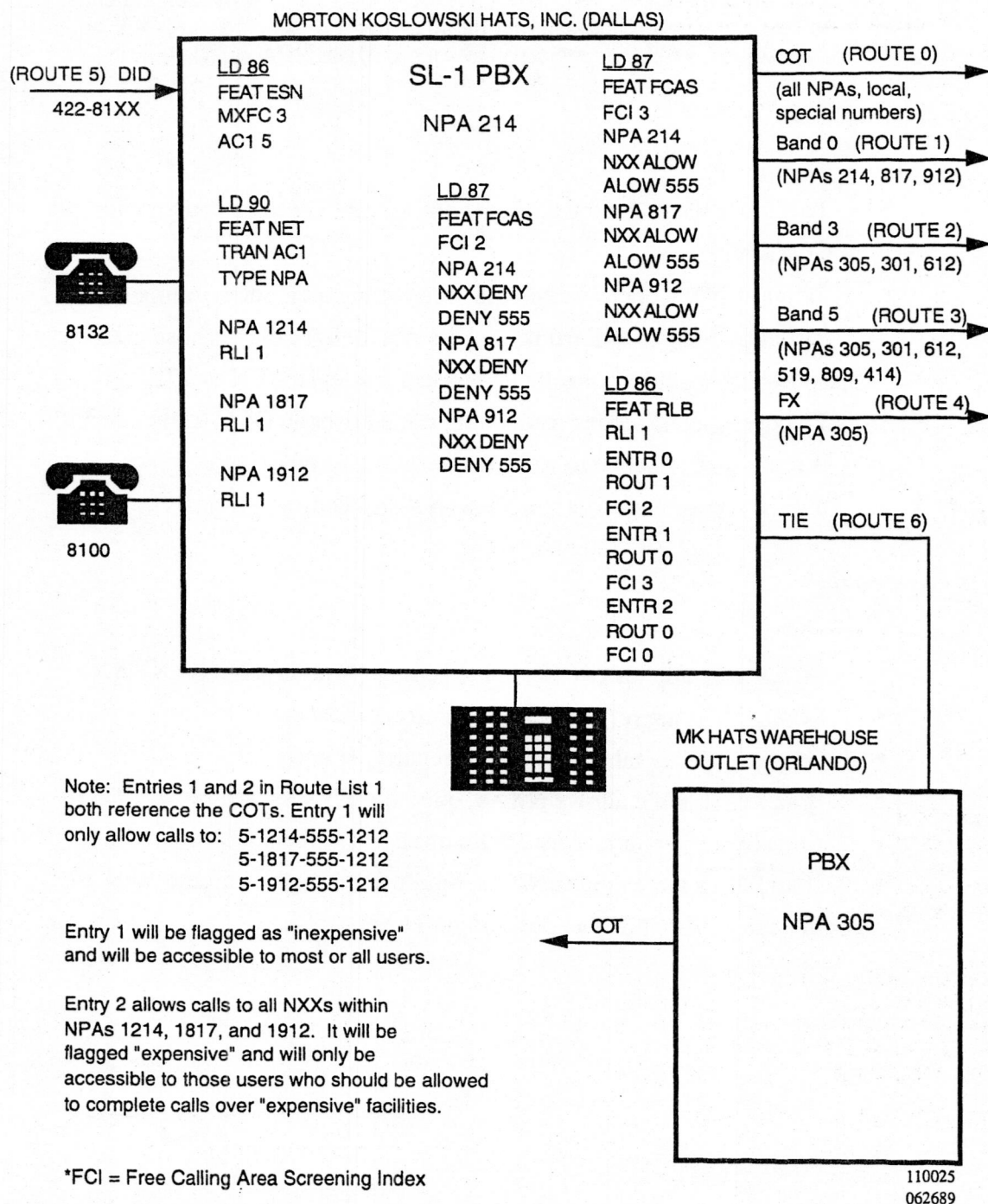


Figure 2

DEFINITION

Free Calling Area Screening (FCAS) is a NARS feature which provides the customer with the capability of full six-digit (NPA-NXX) screening to determine the entry choice for completion of calls in the format AC1+(1)+NPA+NXX+XXXX. FCAS provides a means to deny NPA+NXX on one entry in a Route List while allowing the same NPA+NXX on another entry in a Route List. **FCAS may only be used if an NPA is dialed.**

PURPOSE

- To allow calls in the format (1)+NPA+555+1212 to be routed over COTs only.
- To allow NXX codes within the 'free calling area' surrounding a particular FEX or TIE trunk, and restrict (deny) calls to those NXX codes that would incur toll charges to a particular FEX or TIE.
- To prevent NXX codes from being routed over an OCC trunk when it is more cost-effective to route those calls over other facilities, or when the OCC does not serve the NPA+NXX dialed.

PARAMETERS

- FCAS only applies to calls in the format (1)+NPA+NXX+XXXX.
- FCAS tables are referenced by each Route List entry.
- Only one FCAS table may be referenced per entry.
- If an FCAS table allows NXXs, only those NXXs will be allowed to route over the entry. Any NXXs not listed will be denied.
- If an FCAS table denies NXXs, only those NXXs will be denied over the entry. Any NXXs not listed will be allowed.

LIMITATIONS

- Maximum number of FCAS tables per NARS customer is 256 (# 0-255).
- Maximum number of NPAs per table is fifteen.
- Maximum number of NXXs per NPA is 800.
- NARS reserves FCAS table # 0 to indicate that no Free Calling Area Screening is required for an entry.



MODULE 16

**DESCRIBING NETWORK
CLASS OF SERVICE**

MODULE 16

OBJECTIVES

Network Class of Service (NCOS) defines users' network access characteristics. This module describes the purpose and parameters of NCOS.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of NCOS.
- List the six parameters of NCOS.
- Identify how Facility Restriction Level interacts with NARS software.
- Identify how Equal Access capability interacts with NCOS.
- Identify the limitations of NCOS.
- Identify the three possible intercept treatments provided if a user is denied access to all entries in a Route List via FRL.
- Identify the prompts and responses required to provision NCOS.

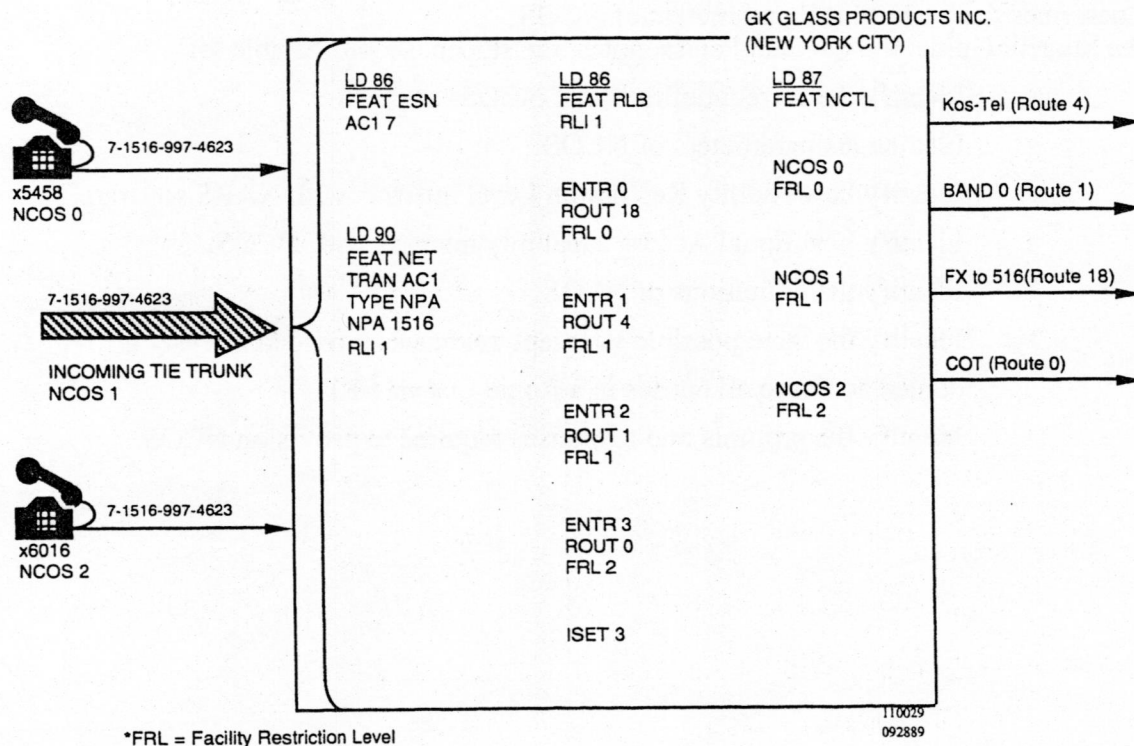


Figure 1

DEFINITION

Network Class of Service is a means of dividing NARS users into groups with different network access restrictions and characteristics. An NCOS will be assigned to: sets; incoming or both way tie trunks; DID trunks; consoles; Forced Charge Account users; System Speed Call lists; DISA DN's; and Authorization Codes.

PARAMETERS

There are six Network Access Characteristics that are defined for each NCOS group:

- Route List entry access control, via Facility Restriction Level (FRL).
- Eligibility to hear Expensive Route Warning Tone (RWTA).
- Eligibility to access the Off-Hook Queuing feature (OHQ).
- Eligibility to access the Call Back Queuing feature (CBQ).
- Eligibility to access Network Speed Call (NSCL).
- Eligibility for Equal Access treatment.

LIMITATIONS

- Switch equipped with NARS: Sixteen, (# 0-15, Releases 1 through 12), 100 (# 0-99, Release 13+)

FACILITY RESTRICTION LEVEL DEFINITION

Associated with each NCOS group is a Facility Restriction Level (FRL) number which ranges from 0 to 7. The FRL is used by the Meridian 1 software to determine the entries in a route list to which a call originator has access.

FACILITY RESTRICTION LEVEL PARAMETERS

- Facility Restriction Levels (FRL) are numbered 0 to 7.
- FRL 0 has the lowest access.
- FRL 7 has the highest access.
- An FRL number will be assigned to each NCOS.
- An FRL number will be assigned to each entry in a Route List.
- To allow for a user access to an entry in a Route List, the FRL assigned to the user's NCOS must be equal to or greater than the FRL assigned to the entry in the Route List.

EQUAL ACCESS DEFINITION

FCC Part 68 regulations require that any equipment or software manufactured or imported on or after April 17, 1992, and installed by any aggregator, must allow all users to use Equal Access codes to selectively access the long distance carrier of their choice. An aggregator is any business that, in the ordinary course of operations, makes telephones available to the public or to transient users of the premises. Aggregators include hotels or motels, hospitals, universities and airports.

Aggregators, although they must allow callers access to any long distance call, are permitted to block calls selectively. Selective equal access lets aggregators choose to block direct-dialed calls that result in charges to the originating telephones. Aggregators cannot block operator-assisted calls.

EQUAL ACCESS PARAMETERS

X11 software supports Equal Access dialing on a per NCOS and per route basis in the following manners:

- Allows operator-assisted North American and international dialing.

- CAC (Carrier Access Code) + 0

- CAC + 0 + (NPA) + NXX-XXXX

- CAC + 01 + CC + NN

- Allows or deny North American and international direct dialing.

- CAC + 1 + (NPA) + NXX-XXXX

- CAC + 011 + CC + NN

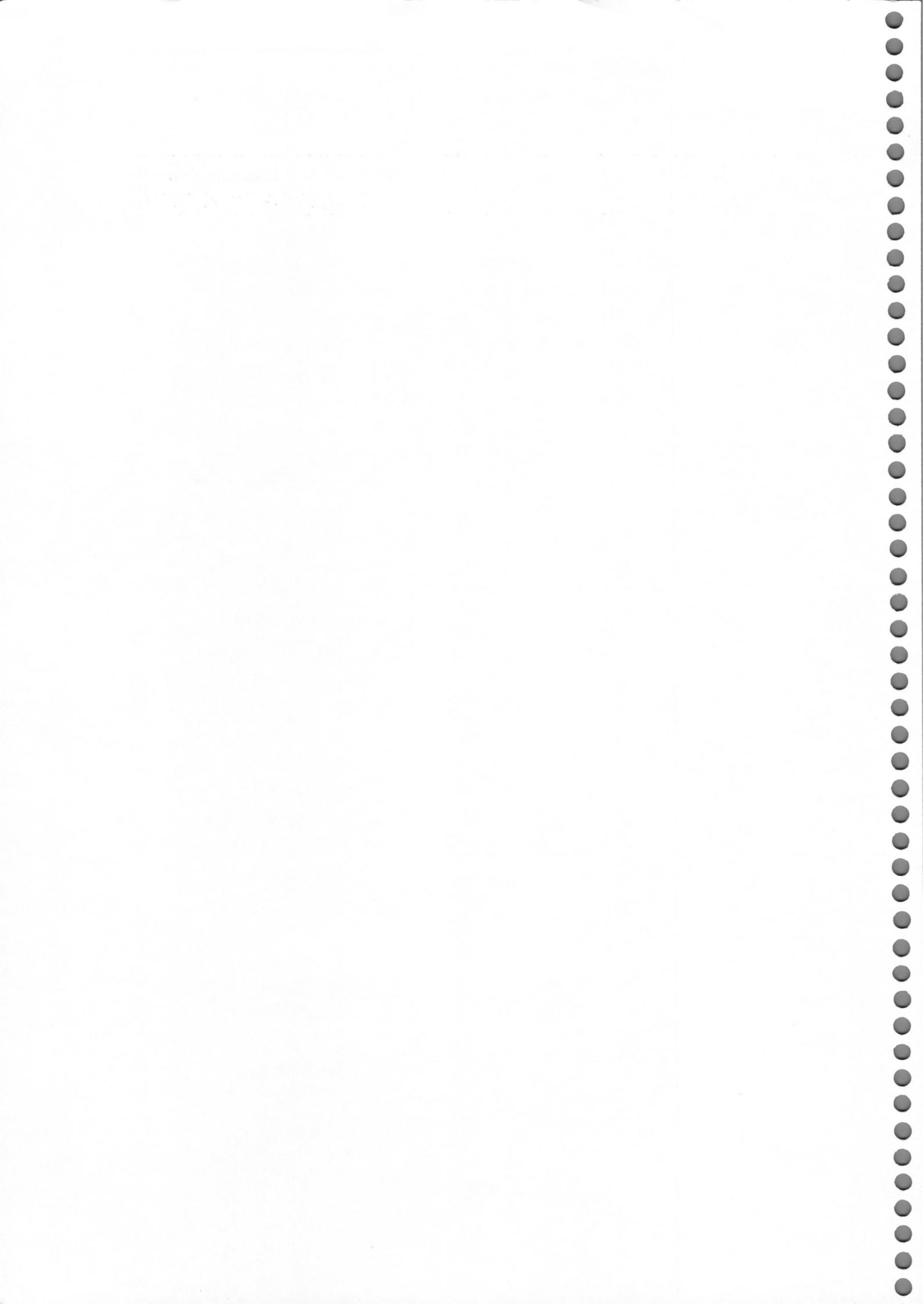
- Equal access compliance supports COT, FEX, DID, and TIE routes.

- Call restriction relies on fixed pattern recognition to determine which calls can be denied. Switch administrators can restrict two kinds of direct-dialed Equal Access calls, CAC + 1 + NPA , and CAC + 011.

CARRIER ACCESS CODE EXPANSION

Prior to the first quarter of 1995, the CAC is defined as 10XXX, where '10' is the Equal Access identifier and XXX is the Carrier Identification Code (CIC). During the first quarter of 1995, Carrier Identification Code Expansion will occur. The CAC will become 101XXXX (an Equal Access identifier of '101' followed by a four-digit CIC). For a period of approximately 18 months following the introduction of the new format, both old and new formats will be accepted. During 1996, support for the 10XXX format will terminate. Meridian 1 software permits both formats.





MODULE 17

**DESCRIBING
ROUTING CONTROL**

MODULE 17**OBJECTIVES**

Sometimes there are portions of each day or entire days of the week when a customer wants to restrict or control a user's access to the network. This module describes the Routing Control feature which can be used to develop alternate NCOS assignments for specific periods each day or entire days of the week.

Given the Student Guide, the QRC and class notes, the student should be able to:

- List two reasons why a customer might use Routing Control.
- Identify the correct definition of Routing Control.
- Identify the purpose and parameters of Routing Control.
- List the three ways Routing Control can be invoked.
- Identify Routing Control feature interactions.
- Identify the prompts and responses required to provision Routing Control.

Koslowski Memorial Teaching Hospital's telecommunications department wishes to provide an alternate set of access characteristics for some of its users at the following times: every day from 11 pm to 7 am; all day Saturday and Sunday; and during major disasters. The original NCOS assignments are:

<u>NCOS:</u>	<u>Assigned to:</u>	<u>Permits:</u>
0	Courtesy phones	Internal calls only
1	Patients	Internal and local
2	Administration	Internal, local and intrastate
3	Doctors	Internal, local, intrastate, all of U.S.
4	Emergency Rooms	Full network access

During Routing Control, courtesy phones, patients, and administration should be allowed internal calling only; doctors should be allowed internal and local calling; and emergency rooms should continue to have full network access.

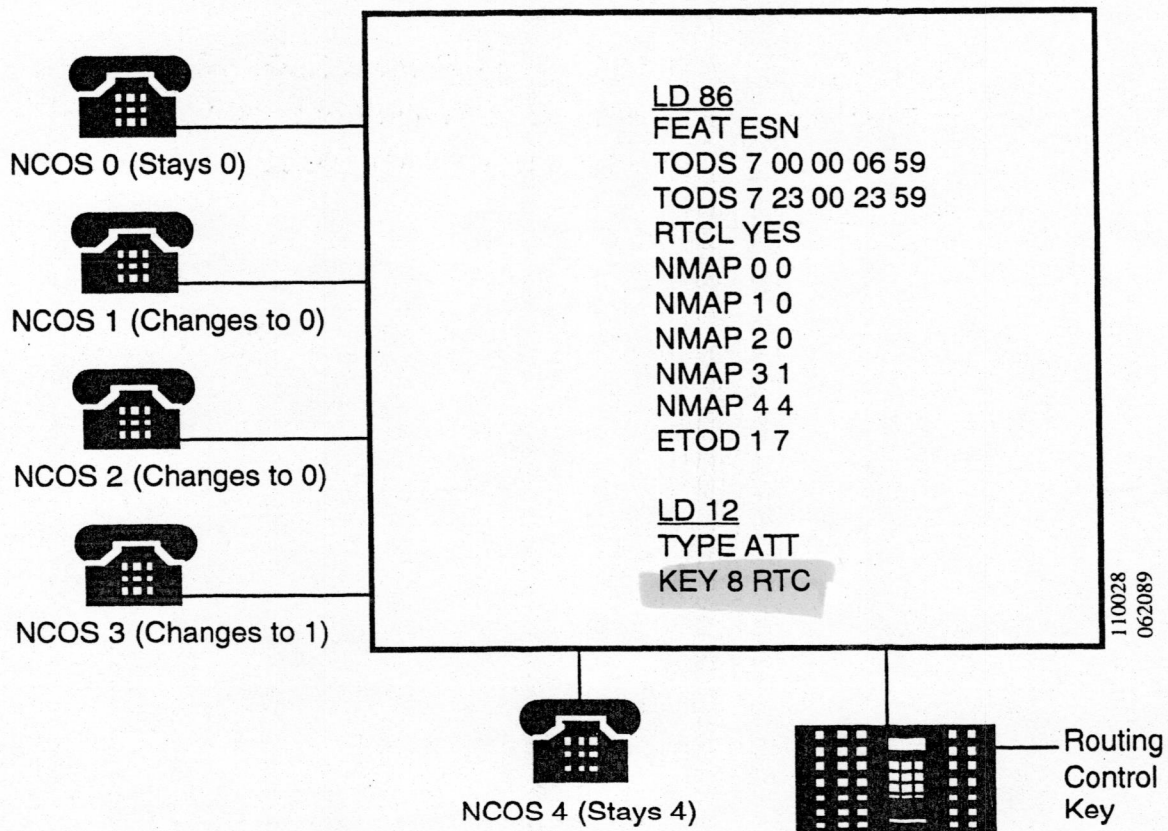


Figure 1

DEFINITION

The Routing Control feature provides a way to reduce or increase a user's network access characteristics by changing the assigned NCOS values. NCOS values may increase or reduce a user's network access eligibility for specific time periods each day and/or entire days of the week.

INVOKING ROUTING CONTROL

Routing control may be invoked via:

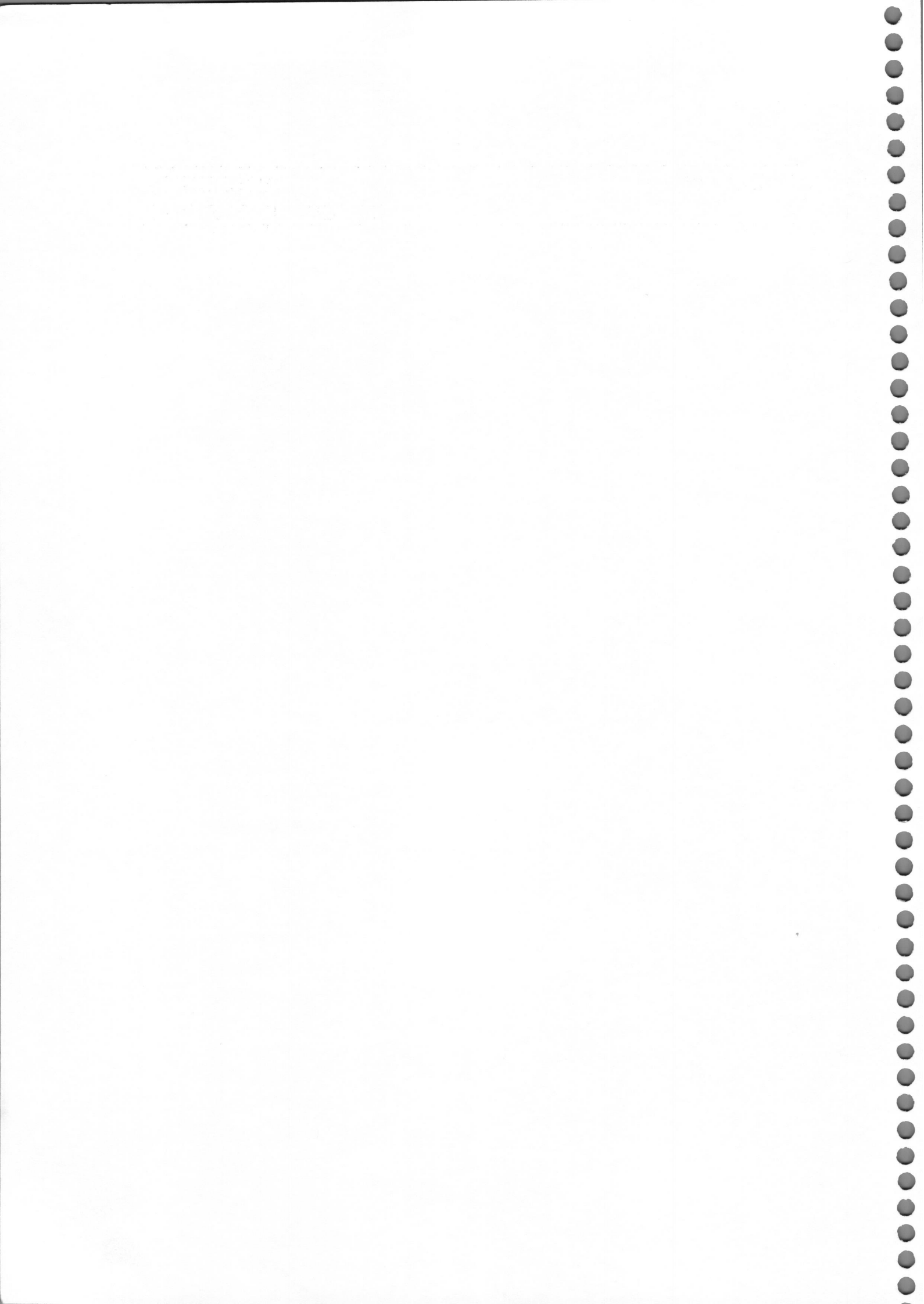
- **A special Time of Day Schedule (TODS 7)** - Alternate NCOS values are assigned for specific time periods each day.
- **Extended Time of Day (ETOD)** - Alternate NCOS values are assigned for the entire 24 hours of a day.
- **A key on the Attendant Console** - Alternate NCOS values are assigned by manual activation at anytime via a key on the Attendant Console. (Routing Control is deactivated when the key is depressed a second time.)

PARAMETERS OF ROUTING CONTROL

- The original set of NCOS numbers and corresponding set of alternate NCOS numbers are defined in an NCOS map.
- The NCOS map lists each NCOS with an alternate NCOS which replaces the original when Routing Control is in effect.
- The alternate NCOS may be the same or different than the original NCOS.

PARAMETERS OF TIME-OF-DAY SCHEDULE 7

- Time of Day Schedule 7 is reserved for blocks of time within a 24-hour period when **daily** Routing Control is required.
- The time(s) specified in Time of Day Schedule 7 may not be defined in Time of Day Schedules 0 through 6.
- Time of Day Schedule 7 must follow the same rules that apply to Time of Day Schedules 0 through 6.
- Time of Day Schedule 7 may also be used to deny access to Route List entries.



MODULE 18

**DESCRIBING
OFF-HOOK QUEUING**

MODULE 18**OBJECTIVES**

Off-Hook Queuing allows a station user who encounters all trunks busy in the ISET to remain off-hook while the system searches the ISET for an idle trunk. This module describes the purpose and parameters of OHQ.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of OHQ.
- List the OHQ eligibility tests.
- Identify the function and parameters of OHQ.
- Identify the OHQ availability test.
- Identify the OHQ offer.
- Identify the maximum time a user may OHQ.
- List the steps the system will perform after the Off-hook Queue timer expires.
- Identify the limitations of OHQ.
- Identify the prompts and responses required to provision OHQ.

Morton Koslowski Hats (Dallas)



DN 8103
NCOS 0 dials
5-1305-658-0398

<u>LD 86</u>	<u>LD 16</u>	
FEAT ESN	ROUT 6	ENTR 1
AC1 5	OHQT 5	ROUT 4
		FRL 0
		EXP NO
<u>LD 87</u>	ROUT 4	OHQ
FEAT NCTL	OHQT 10	YES
SOHQ YES		
OHTL 60	ROUT 2	ENTR 2
NCOS 0	OHQT 15	ROUT 2
FRL 0		FRL 0
OHQ YES	ROUT 3	EXP NO
	OHQT 6	OHQ
		YES
<u>LD 90</u>	ROUT 0	ENTR 3
FEAT NET	OHQT 6	ROUT 3
TRAN AC1		FRL 1
TYPE NPA	<u>LD 86</u>	EXP NO
NPA 1305	FEAT RLB	OHQ
RLI 10	RLI 10	YES
	ENTR 0	ENTR 4
	ROUT 6	ROUT 0
	FRL 0	FRL 1
	EXP NO	EXP YES
	OHQ YES	OHQ NO
		ISSET 4

110031
092789

OHQ* = Off-Hook Queuing

- There are currently 7 priority 3 calls in queue on Route 6
- There are currently 10 priority 3 calls in queue on Route 4
- There are currently 18 priority 3 calls in queue on Route 2
- There are currently 12 priority 3 calls in queue on Route 3
- There are currently 4 priority 3 calls in queue on Route 0

NOTE: TOD = All ON and FC1 = 0 for all RLI Entries.

Figure 1

DEFINITIONS

Off-Hook Queuing (OHQ) allows a station user who encounters all eligible trunks busy in the ISET to remain off-hook while the system searches the ISET for an idle trunk. If an idle, eligible trunk is found in the ISET, the call completes. If no idle, eligible trunk is found in the ISET, within the Off-Hook Queue time limit (a customer-defined time from two seconds to one minute), the call is removed from the OHQ, and the system will search the ESET **one time** for an idle, eligible trunk. If an idle, eligible trunk is found in the ESET, the call completes with no ERWT. If no idle, eligible trunk is found in the ESET, the call originator receives intercept treatment. **OHQL**

PARAMETERS

- Off-Hook Queuing (OHQ) package must be equipped.
- Call must pass the OHQ eligibility and availability tests.
- Maximum time in the OHQ is one minute.
- OHQ is allowed on the **ISET only**.
- OHQ offer is one burst of tone.
- Calls entering the OHQ will be assigned a priority of "3" - i.e., they will be considered high priority and therefore the system will attempt to serve them before other queued calls.

ELIGIBILITY

NARS/BARS calls may be placed in the OHQ if all eligible trunk routes in the ISET are busy, and the following criteria are met:

- OHQ is enabled for the customer.
- The NCOS of the call originator allows OHQ.
- At least one entry in the ISET to which the user has access (via FRL, TOD and FCI) must allow OHQ.

AVAILABILITY TEST

After a call has passed **all** the OHQ eligibility tests, the system will then perform the OHQ availability test. If the call fails either the OHQ availability test or any OHQ eligibility tests, the system may attempt to offer Call Back Queuing (CBQ).

Availability Test Purpose

The software performs an availability test to prevent calls from entering the OHQ when there is a high probability that the OHQ timer will expire before a trunk becomes available.

Availability Test Parameters

For each trunk route, a counter is maintained which reflects the current number of calls with the maximum queue priority of 3 queued against the route. This includes all calls in the OHQ, Ring Again via direct trunk access, and those CBQ calls that are currently assigned priority 3.

Each trunk route has a threshold value which indicates the maximum number of priority 3 calls that may be queued against it before OHQ timeout becomes a high probability. Before a call is placed in the OHQ, the current queue count is compared with the threshold value for **each eligible trunk route in the ISET**. If at least one of the trunk routes has a count which is **less than** the threshold value, the call is allowed to OHQ against all OHQ-eligible routes.

OHQ OFFER

If all eligibility and availability tests are successful, the call originator is given OHQ offer tone (a one-second burst of 440Hz) when the call enters the OHQ. The call originator either accepts the OHQ offer by remaining off-hook, or declines the offer by going on-hook.

OHQ TIME LIMIT

A customer-defined time limit of from 2 to 60 seconds specifies the maximum amount of time a call may remain in the OHQ. When the timer expires the call is removed from the queue, and the system will search the ESET **one time** for an idle, eligible trunk.

OHQ OPERATION

After the system has searched the Initial Set and found all eligible routes busy:

- OHQ eligibility tests are performed; if successful:
- OHQ availability tests are performed; if successful:
- A one-second burst of tone advises the user that the call is being placed in the OHQ.
- The call queues at priority level 3 against all eligible entries in the ISET that allow OHQ.
- The OHQ timer starts.
- If an eligible trunk in the ISET becomes idle before the timer expires, the system seizes the trunk and completes the call.
- If no eligible trunk becomes idle before the timer expires, **the call is removed from the OHQ**. The ESET is searched once for an idle, eligible trunk.
- If an idle, eligible trunk is found in the ESET, the call completes and **no Expensive Route Warning Tone** will be provided.
- If no idle, eligible trunk is found, the caller receives one of three customer-defined intercept treatments.

FEATURE INTERACTIONS

- **Call Modification.** Station users are not allowed to activate call modification features (e.g.; Hold, Conference, Transfer) while waiting in the OHQ. The switchhook flash used to activate features from 500/2500 sets is ignored. Operation of multi-line set feature keys is ignored.
- **Camp-on, Call waiting.** When a call is presented to a station that is in the OHQ, call-waiting and camp-on features are operational, but the associated tones are inhibited.

MODULE 19**OBJECTIVES**

Call Back Queuing (CBQ) provides a means for a call originator who encounters all eligible trunks busy in the ISET to activate Ring Again and go on-hook. This module describes the CBQ feature and its components.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of Call Back Queuing.
- Identify the parameters of CBQ.
- List the six components of CBQ.
- Identify the function and purpose of the two Call Back Queuing options.
- List the six eligibility tests for CBQ.
- List the two Call Back Queuing offers.
- Identify the correct definition of Priority Queuing.
- Identify the correct definition of Route Advance Timer.
- Identify the components and parameters of Route Advance Timer.
- Describe the CBQ call back process
- Identify the limitations of CBQ.
- Identify the prompts and responses required to provision CBQ.

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<u>LD 86</u> FEAT ESN AC1 5 ERWT YES ERDT 6	<u>LD 86</u> FEAT RLB RLI 10 ENTR 0 ROUT 6 FRL 0 EXP NO CBQ YES	ENTR 4 ROUT 0 FRL 1 EXP YES CBQ YES
<u>LD 87</u> FEAT NCTL SCBQ YES CBTL 18 RANE 16 NCOS 1 FRL 1 RWTA YES CBQ YES ROUT A RADT 4 SPRI 0 MPRI 2 PROM 1	ENTR 1 ROUT 4 FRL 0 EXP NO CBQ YES ENTR 2 ROUT 2 FRL 0 EXP NO CBQ YES	ISSET 4 <u>LD 11</u> TYPE SL1 NCOS 1 KEY 6 RGA
<u>LD 90</u> FEAT NET TRAN AC1 TYPE NPA NPA 1305 RLI 10	ENTR 3 ROUT 3 FRL 1 EXP NO CBQ YES	ALL ENTRIES IN RLI 10 ARE CUR- RENTLY BUSY

110032
092789

CBQ* = Call Back Queuing

NOTE: TOD = ALL ON and FCI = 0 for all RLI entries.

Figure 1

DEFINITION

CBQ allows a call originator who encounters all eligible trunks busy in the ISET to activate Ring Again and go on-hook. The system will continue to search the ISET for an idle, eligible trunk.

When an eligible trunk becomes available, the system will notify the user via Ring Again. The user goes off-hook and depresses the Ring Again key. The call will complete.

PARAMETERS

Switch must be equipped with the FCBQ feature package.

ELIGIBILITY

Before offering CBQ to a call originator, the following eligibility tests are performed. The call must pass all tests.

- The call is not eligible for OHQ.
- The CBQ feature is enabled for the customer.
- The user's NCOS is defined as permitting CBQ.
- At least one entry in the ISET to which the user has access (via FRL, TOD and FCI) allows CBQ.
- The user's telephone is allowed to access the Ring Again feature.
- Ring Again is not active on user's set.

If any one of these tests is unsuccessful, the system will abandon the queuing process and search the ESET for an idle, eligible trunk.

OPTIONS

One of two options for examination of Route List entries is defined in each call originator's NCOS. The first option, ROUT(I), means that CBQ may be offered after **only** the ISET of a Route List has been examined for an idle, eligible trunk. The second option, ROUT(A), means that CBQ may be offered after **both** the ISET and ESET (all entries) of a Route List have been examined. **In either case, a call offered CBQ is queued initially against only the ISET.**

ROUT (I)

For call originations assigned ROUT(I), the system searches the ISET only for an idle, eligible trunk. If none is found, CBQ is offered to the caller **immediately**.

ROUT (A)

For call originations assigned ROUT(A), the system examines the ISET for an idle, eligible trunk. If none is found, the ESET is **then** searched for an idle, eligible trunk. If none is found in the ESET, CBQ is offered. However, if an idle, eligible trunk in the ESET is found and Expensive Route Warning Tone is not enabled, the call completes. CBQ will not be offered. If an idle, eligible trunk in the ESET is found and Expensive Route Warning Tone is enabled, the Expensive Route Warning Tone is provided and the system delays in processing the call. This delay time is customer-defined (two seconds to ten seconds). During the delay, the call originator has the following three options:

- Refuse the expensive route by abandoning the call.
- Wait, and allow the call to complete over the expensive route.
- Activate the Ring Again feature to place call in the CBQ.
- ROUT(A) must be defined in the user's NCOS; otherwise, operation of the Ring Again feature is ignored.

OFFER

After the appropriate Route List entries have been examined, the call originator is informed that the call may be placed in the CBQ by one of two customer-defined offers. The standard CBQ offer is thirty seconds of overflow tone. The optional CBQ offer is a recorded announcement followed by thirty seconds of overflow tone. Ring Again may be activated at any time during overflow tone. The CBQ offer may be refused by going on-hook. If the station user neither accepts nor refuses the CBQ offer within thirty seconds, line lockout treatment is provided.

- If a call originator's NCOS is assigned ROUT(A) and Expensive Route Warning Tone has been heard, Expensive Route Warning Tone may be considered a CBQ offer also.

CBQ PRIORITY QUEUING

When a new call enters the queue, it does not necessarily enter at the end of the queue. Instead, the call enters the queue **behind** any calls with the same or **higher** priority level and **ahead** of any calls with a **lower** priority level.

CBQ Priority Queuing is the process by which calls are queued against a trunk route by priority. Calls with a higher priority level are queued ahead of calls with a lower priority level. Calls are assigned one of four priority levels (numbered 0 through 3). The lowest priority is 0 and the highest priority is 3.

Components of CBQ Priority Queuing

Calls may advance in priority after remaining at their current priority for a specified length of time.

Priority Queuing has three components:

- The Starting Priority (SPRI) specifies the priority level of the call when it is first placed in queue.
- The Maximum Priority (MPRI) specifies the highest priority level to which a call may advance.
- The Promotion Timer (30 seconds to 15 minutes) specifies the amount of time a call remains at **one** priority level before advancing to the next higher level.

PROM 1 → 30 sec
2 → 1 min.

Parameters of CBQ Priority Queuing

- The switch must be equipped with the Priority Queuing package (PQUE).
- A Starting Priority level, a Maximum Priority level, and a Promotion Time are assigned to each NCOS.
- A promotion timer of 0 indicates that the call will never promote.

ROUTE ADVANCE TIMER

The Route Advance Timer (RADT) specifies the maximum amount of time a call remains in the CBQ **against the ISET only**. When the Route Advance Timer expires, the system searches for an idle, eligible trunk in the ESET. If an idle, eligible trunk is found, the system will seize it and alert the user via Ring Again. If no idle, eligible trunk is found, the call may **queue on the ESET, assuming the user has access to the ESET and CBQ is enabled for ESET entries**.

Route Advance Timer and Expensive Route Warning Tone

If the Route Advance Timer expires and the system finds an idle, eligible trunk in the ESET, the system will alert the user via Ring Again. The user will **not** receive Expensive Route Warning Tone even if it is enabled.

Guidelines for Setting the Route Advance Timer

As soon as a call enters the CBQ, both the Route Advance Timer and the Promotion Timer begin to mark time. Each timer operates independently of the other. This may cause the Route Advance Timer to expire before a call has been promoted to its maximum priority. To increase the probability of seizing a trunk in the ISET, the Route Advance Timer should be set higher than a call's total promotion time.

PARAMETERS OF ROUTE ADVANCE TIMER

- Route Advance Timer (RADT) is associated with an NCOS.
- The Route Advance Timer may be set from 30 seconds to 15 minutes.
- A Route Advance Timer of 0 means the system will never allow the call to queue against the ESET.

CBQ CALLBACK

When a trunk becomes idle it is seized to prevent incoming originations during the CBQ callback period. Outpulsing of digits is started at a slow fixed rate.

The number of digits outpulsed may determine how long the trunk may be held while the CBQ callback is being offered. The system computes this time by allowing 10 seconds before the first digit is outpulsed and 2.56 seconds between subsequent digits.

The originator of the call is alerted to the CBQ callback by either tone buzzing and a winking Ring Again feature lamp (multi-line sets), or short bursts of ringing (500/2500 sets).

The multi-line set user must accept the callback within the computed value of outpulse time or the customer-defined CBQ time limit of 10 to 30 seconds, whichever is less. **CBTL**

A user of a 500/2500 set must accept the callback within six seconds. If the user does not answer the callback within the time limit, the call is cancelled.

FEATURE INTERACTIONS

Hunting, Call Forward, Multiple Appearance DN. CBQ callbacks are offered only to the originating station, regardless of the hunting or call forwarding which may be in effect. Other appearances of a station's Directory Number are not offered the callback.

Attendant. Because the SL-1 Ring Again feature is not supported at Meridian 1 attendant consoles, CBQ is not offered to an attendant regardless of the CBQ eligibility of the NCOS assigned to the attendant.





MODULE 20

**DESCRIBING NETWORK
AUTHORIZATION CODES**

MODULE 20**OBJECTIVES**

The Network Authorization Code feature enables selected users to temporarily replace the access restrictions assigned to the station or incoming tie trunk. This module describes the function and parameters of Network Authorization Codes.

Given the Student Guide the QRC and class notes, the student should be able to:

- Identify the correct definition of Network Authorization Codes.
- Identify the correct definition of Authorization Code Conditionally Last.
- Identify the parameters of Network Authorization Code.
- Identify the limitations of Network Authorization Code.
- Identify the correct definition of Station Specific Authorization Codes.
- Identify the Release 21 enhancements to Authorization Codes
- Identify the prompts and responses required to provision Network Authorization Codes.

Some users at GK Glass Products Inc. in New York have been assigned Authorization Codes so that they may place the calls they normally place from their own phones from any other phone in the company.

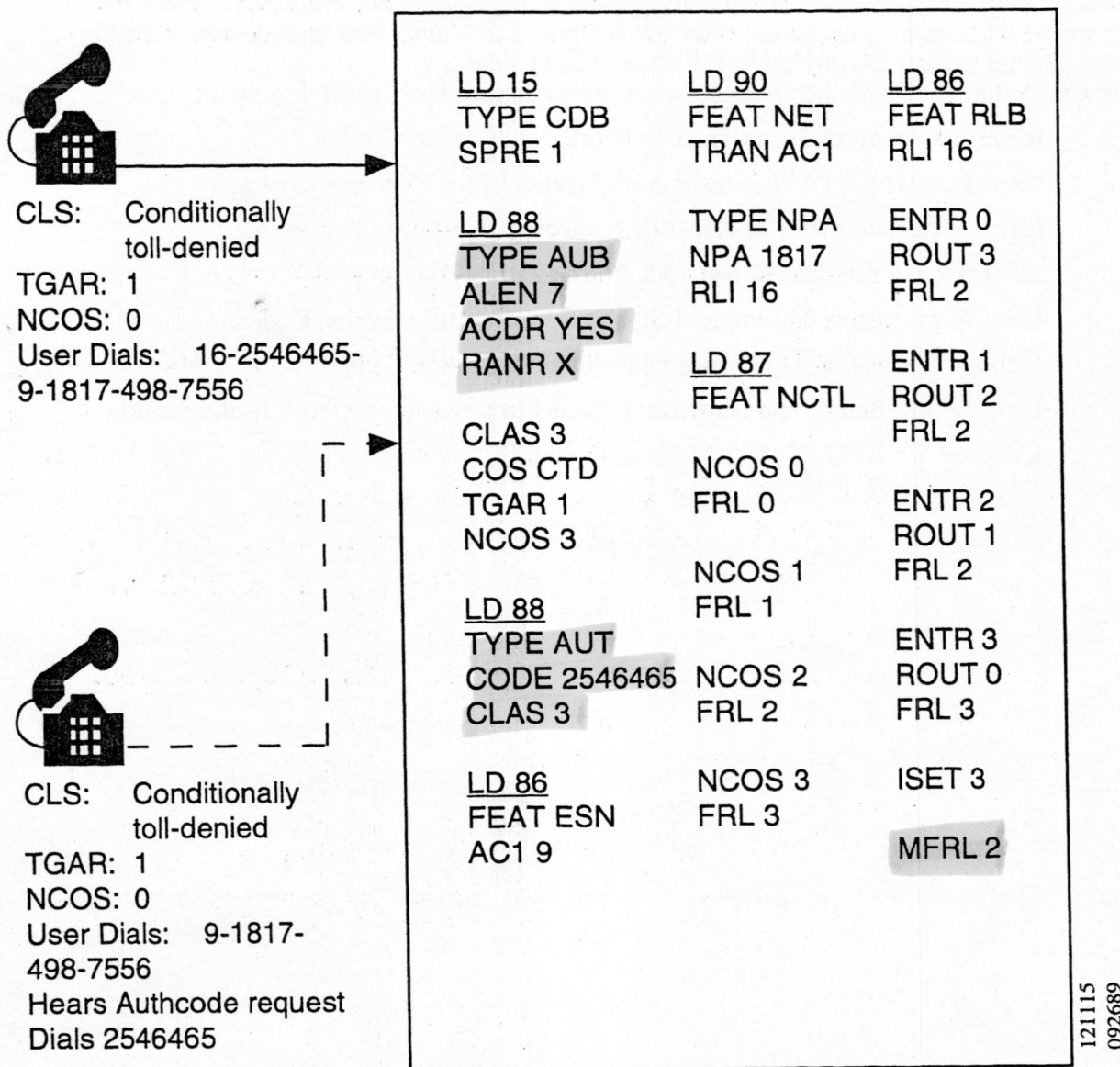


Figure 1

DEFINITION

The Network Authorization Code feature enables users to temporarily override the access restrictions assigned to a station or tie trunk. A user may enter an Authorization Code (Authcode) to access different system facilities than would normally be allowed because of the assigned Network Class of service (NCOS), Class of Service (CLS) and Trunk Group Access Restriction (TGAR).

PARAMETERS

- NAUT, BAUT, and CAB packages must be equipped.
- Total of 20,000 (Rls. 1 through 12) or 50,000 (Rls. 14+) Authorization Codes per customer. (SUCCESSION 1000/M1000)
- Authorization Codes may be from one to seven (Rls. 1 through 12) or one to fourteen (Rls. 13+) digits in length.
- An Authcode may be entered when:
 - Originating a call from a station or tie trunk.
 - Initiating a call transfer or conference from a local station.
 - Originating a call via Direct Inward System Access (DISA).
- Use of Authcodes may be recorded in CDR.
- The combined CLS, TGAR and NCOS values used by an Authcode are referred to as a Classification Code (Classcode).
- A Classcode is assigned to each individual Authcode.
- Total of 116 Classcodes (# 0-115). ✓
- All Authcodes for a customer must be the same length.
- Authcodes may be automatically generated by the system.
- Authcodes are not affected by routing controls.

ALLEN 14 NAUT
A
ALLEN 7 BAUT

NETWORK AUTHCODE OPERATION

The station user dials SPRE code + 6 + the Authcode. If the Authcode entered is valid, dial tone is heard again and the user dials the telephone number. If the Authcode is not valid, line lockout treatment is provided (overflow tone or route to the attendant or both) after the time-out period.

AUTHCODE CONDITIONALLY LAST DEFINITION

With the Network Authcode feature, users may be prompted 'conditionally' for an Authcode after dialing a call. The prompt consists of: ten bursts of dial tone, followed by steady dial tone; or recorded announcement, followed by ten bursts of dial tone, then steady dial tone. The user is prompted for an Authcode if:

- An Authcode was not entered prior to dialing the telephone number, and
- The Facility Restriction Level (FRL) associated with the user's Network Class of Service is lower than the assigned Minimum FRL of the Route List being used for the call.
- If the call is incoming on a tie route from another network PBX, the prompting for an Authcode must **also** be allowed for that TIE trunk route.

DIRECT PRIVATE NETWORK ACCESS (DPNA)

With Release 21, the Direct Private Network Access feature (package 301) enhances the Authcode Conditionally Last feature by offering an Authcode Last Retry function. This enhancement provides the following new capabilities to Authcode Last calls:

- If a caller enters an authorization code that is invalid (the first time entered), the caller is prompted to enter the Authcode again.
- If a caller realizes they have misdialled, an octothorpe (#) can be pressed immediately and the user will be prompted to re-enter the Authcode.

Reprompt for the Authcode takes the form of:

- Authcode Last Request tone
or
- Recorded Announcement (RAN) before the Authcode Last Request tone.

If a RAN has been programmed to indicate that an incorrect Authcode has been dialed, any digits dialed while that RAN is being given will be ignored

- If an invalid Authcode is entered a second time, the existing invalid Authcode treatment (Line Lockout) is given.

AUTHORIZATION CODE SECURITY ENHANCEMENT

With Release 21 software, the Authorization Code Security Enhancement increases system security and helps prevent toll fraud. This feature now alerts the System Administrator when an invalid Authcode is entered by generating an Authcode Alarm on the maintenance terminal. (Exception: Calls originated from the attendant console do not generate an Authcode Alarm.)

The Authcode Security Enhancement adds a new class of alarm, SECA or Security Administration. Its benefits include:

- It distinguishes security violations from all other types of system messages.
- The system prints the message SECA001 on the TTY indicating that an invalid use of an Authcode has occurred when an invalid Authcode has been dialed.
- The alarm message includes information regarding :
 - The originating station or trunk TN
 - The Calling Line ID (CLID) if the call originates from an ISDN trunk
 - The Authcode entered

The Authorization Code Security Enhancement generates an Authcode Alarm per invalid attempt and prints it on the Maintenance TTY, the Filtered Alarm Output Consoles, (FIL TTY) and History File, if programmed.

AUTHCODE LAST OPERATION

- User dials call.
- User receives an Authcode request:
 - Ten bursts of dial tone or, recorded announcement followed by ten bursts of dial tone.
- User dials Authcode (SPRE+6 not required).
- If the Authcode is valid, the call is processed with the Authcode's NCOS used for the call.
- If the Authcode is invalid and the Authcode Last Retry has been programmed, the user will hear the standard retry offer (ten bursts of dialtone) or the optional RAN retry offer

- If the Authcode is invalid, and the Authcode Last Retry has not been programmed, one of the flexible customer-defined lockout treatments is returned to the user (overflow tone or route to the attendant or both) after the time-out period.

STATION SPECIFIC AUTHORIZATION CODES

Station Specific Authorization Codes became available with X11 release 19 software. This feature gives the system administrator the ability to control the level of authorization code access on a per telephone basis. Station Specific Authorization Codes apply to 500/2500 and digital/multi-line telephones.

PARAMETERS

Three levels of access are provided:

- Auth Code Unrestricted - (**AUTU**) An AUTU telephone has no authorization code access limitations. Any valid auth code is accepted and processed normally.
- Auth Code Restricted - (**AUTR**) An AUTR telephone can enter up to six assigned authorization codes. The auth code entered must match one of the pre-assigned codes. Any other code will be rejected and the call will not be completed.
- Auth Code Denied - (**AUTD**) An AUTD phone has no access to authorization codes.





MODULE 21

**DESCRIBING
NETWORK SIGNALING**

MODULE 21

OBJECTIVES

This module describes the Network Signaling feature. This feature is used to define signaling arrangements between a Meridian Node and another switch connected to it by tie trunks.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of Network Signaling.
- List the five types of Network Signaling.
- Identify the required Network Signaling types in a Network configuration.
- Identify the information transmitted to/from an M-1 Node to/from network PBXs.
- Identify the prompts and responses required to provision Network Signaling.

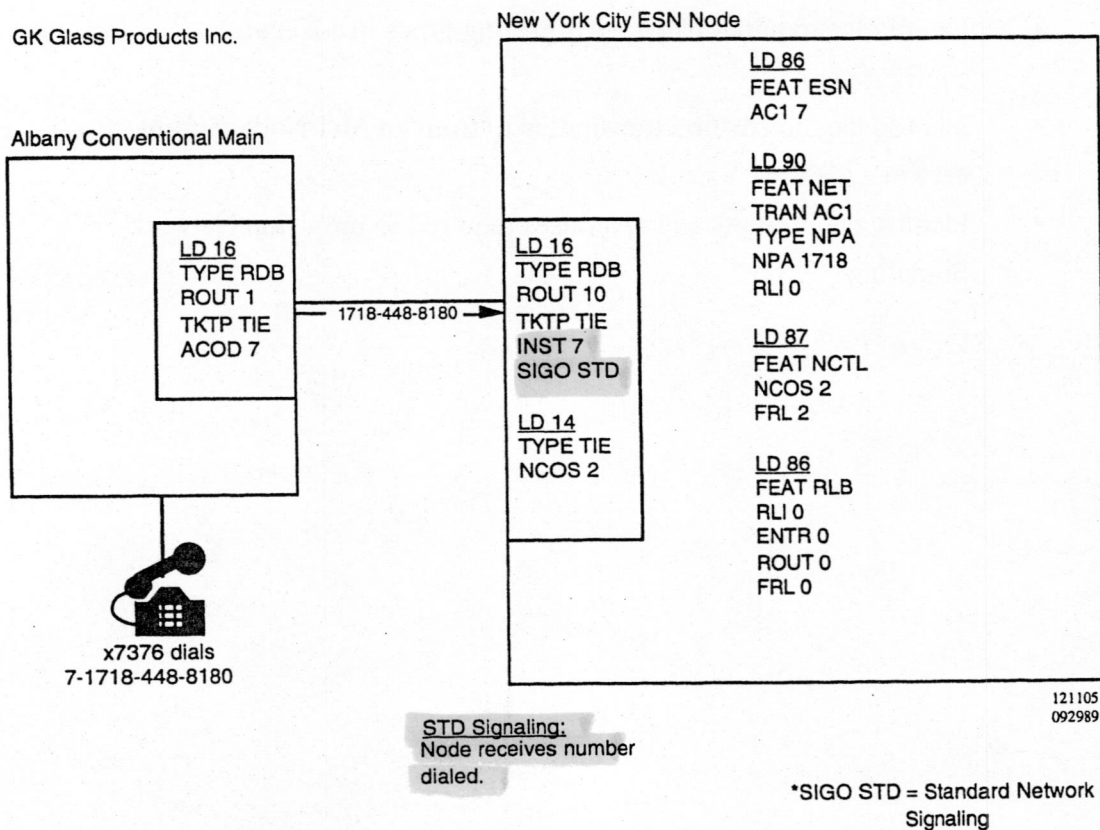


Figure 1

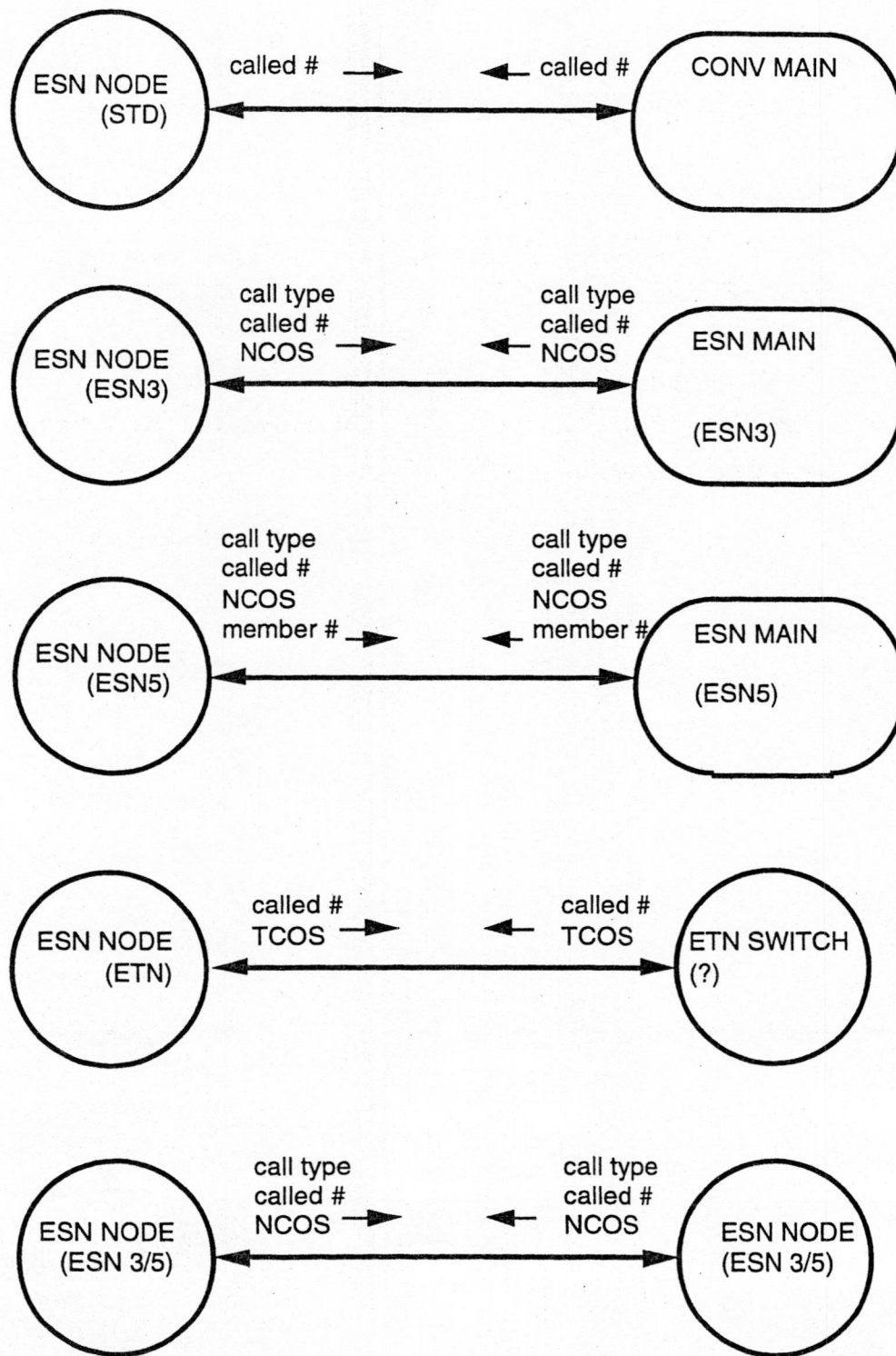
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092989

Figure 5

- ESN 5 - Arranges the tie trunk group as described for ESN 3, needed with DTI.
 - The **call types** are:
 1. PLACING A NETWORK CALL
 2. ACTIVATING RING AGAIN
 3. ACCEPTING A CALL BACK
- ETN - Arranges the tie trunk group for transmission/reception of called number and TCOS/TCM when connected to an ETN switch. Sends outpulsed digits and TCOS.

NETWORK SIGNALING DEFINITION

The Network Signaling Feature (NSIG) provides the required signaling protocol to interface Meridian 1 ESN Nodes with Meridian 1 ESN Mains, Meridian 1 ESN Nodes, Conventional Mains, and ETN Switches. When the NSIG feature is equipped at a switch, there are options available to define the signaling arrangements between that switch and any other switch connected to it via tie trunks. These options define what call information is received from or transmitted to a connected switch.

NETWORK SIGNALING PARAMETERS

- Meridian 1 ESN Nodes and Meridian 1 ESN Mains must have the NSIG package equipped and the defined protocol must match on both ends of the connecting facility.
- TIE trunks connecting Main to Node or Node to Node must have the following characteristics:
 - digitone
 - two-way
 - answer supervision
 - wink start

NETWORK SIGNALING OPTIONS

- STD (standard) - Arranges the tie trunk group for transmission/reception of the called number between switches. Sends outpulsed digits.
- ESN (Allowable -X11 Rls 2 only) Arranges the tie trunk group for transmission/reception of the **call type**, NCOS, and called number
- ESN2 (X11 Rls 3 and later) Arranges the tie group as described for ESN in X11 Rls 2. Used unless switch has NXFR or Satellite Link Control.
- ESN 3 - (X11 RLS 3 or 4) Arranges the tie trunk group as described for ESN. This type of signaling supports Network Transfer and Satellite Link Control.

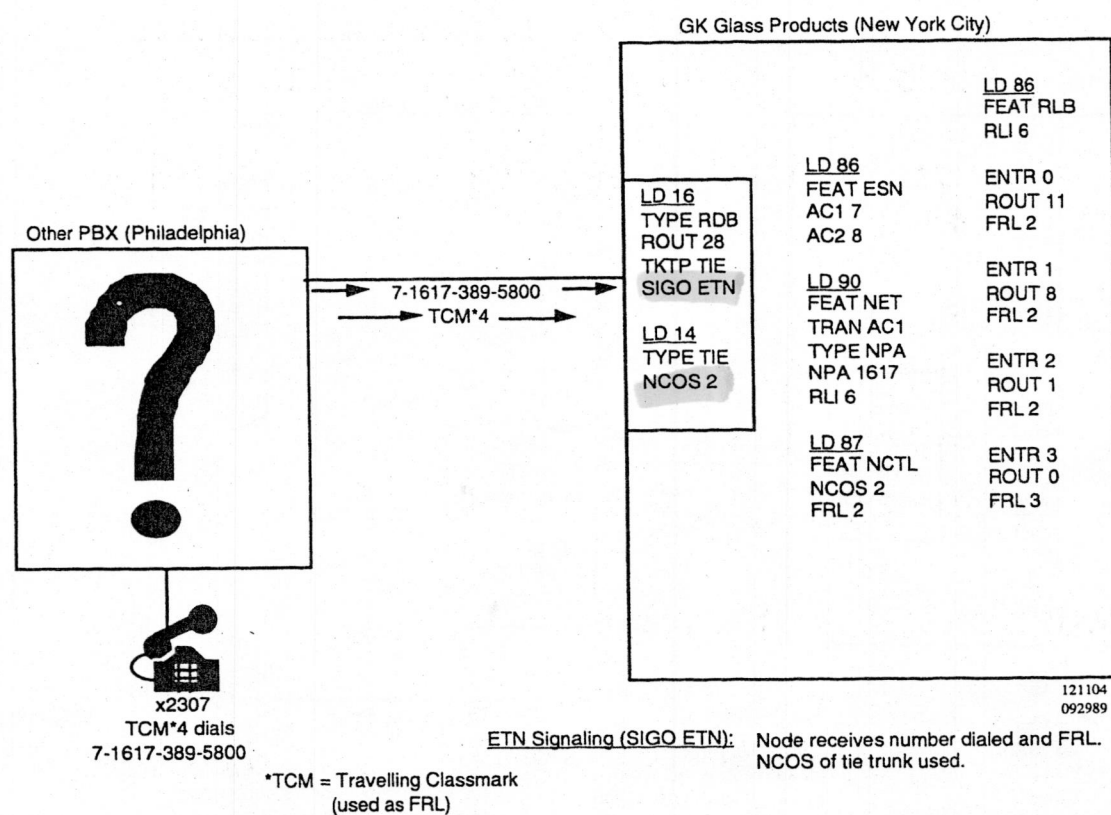
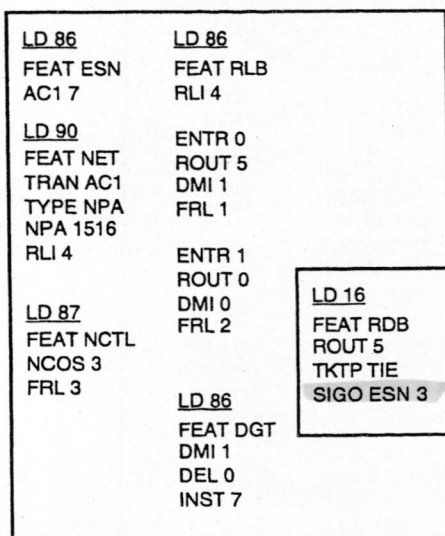


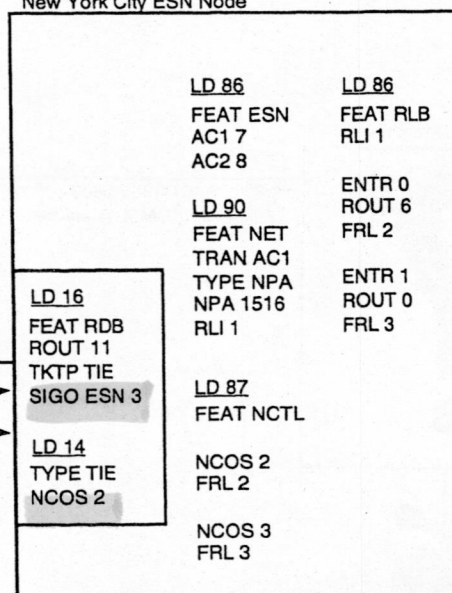
Figure 3

GK Glass Products Inc.

Boston ESN Main



New York City ESN Node



Network call
7-1516-352-4512
NCOS 3

ESN * Signaling:
Node receives call type,
number dialed, and NCOS
number

*-ESN3 when not equipped with
Network Transfer or network-wide
Coordinated Call Back Queuing.
-ESN5 when equipped with Network
Transfer or Coordinated Call Back
Queuing.

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092989

Figure 2



SATELLITE LINK CONTROL DEFINITION

The Satellite Link Control feature ensures that the configuration of a call does not include more than one communications satellite trunk. Tandem trunk calls, when connected through more than one communications satellite trunk, are subject to transmission distortion due to propagation.

SATELLITE LINK CONTROL PARAMETERS

- Network Signaling (NSIG) package is required.
- Route must be configured with ESN3 or ESN5 signaling.
- Route must be designated as a satellite route.

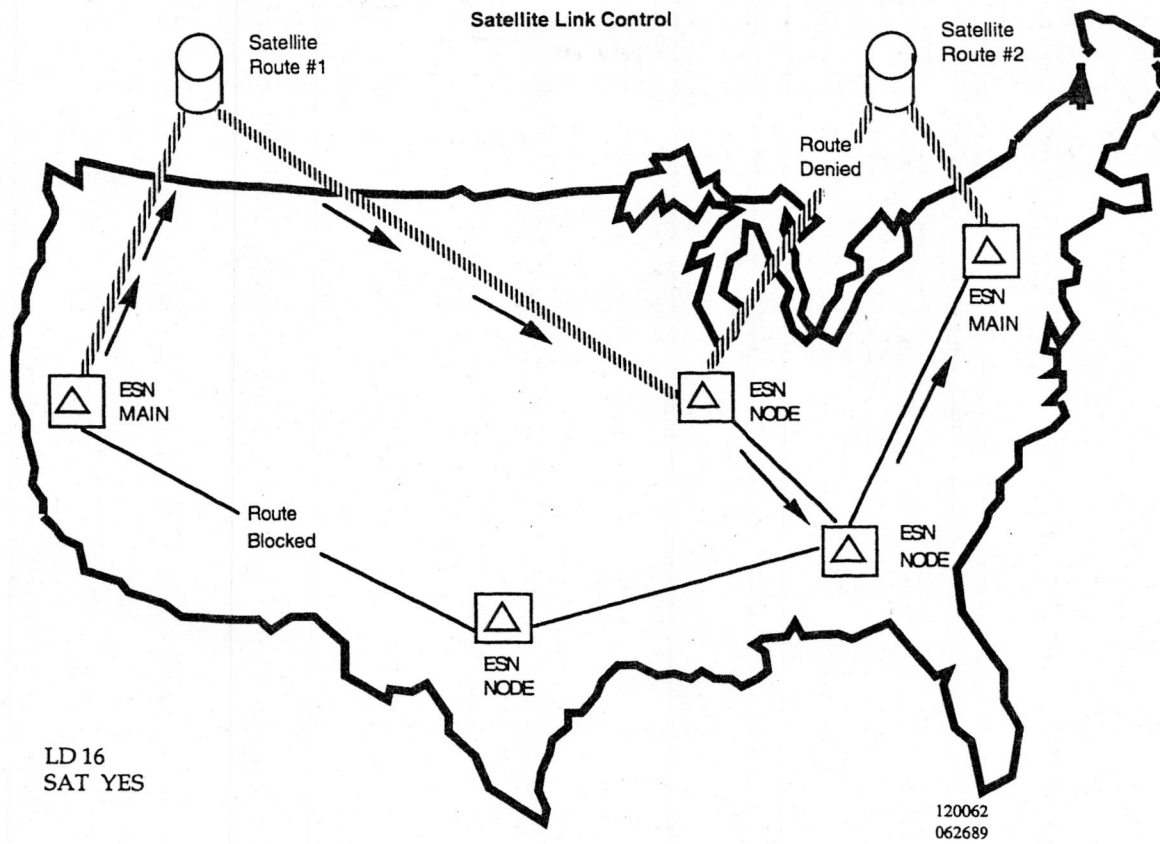


Figure 2

NETWORK TRANSFER DEFINITION

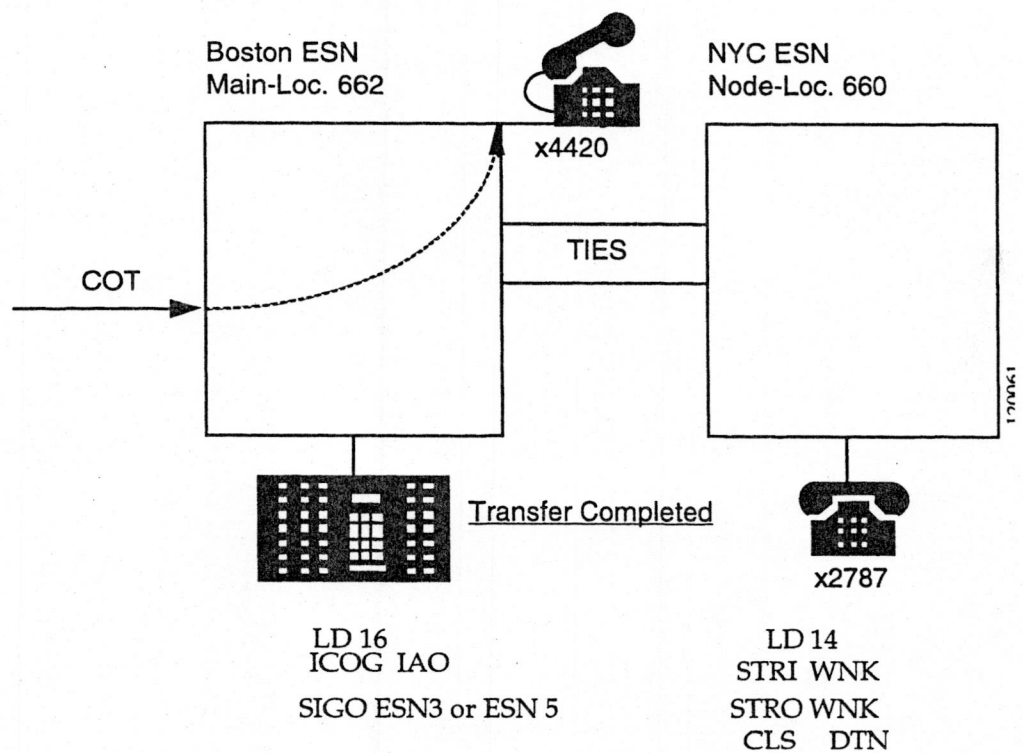
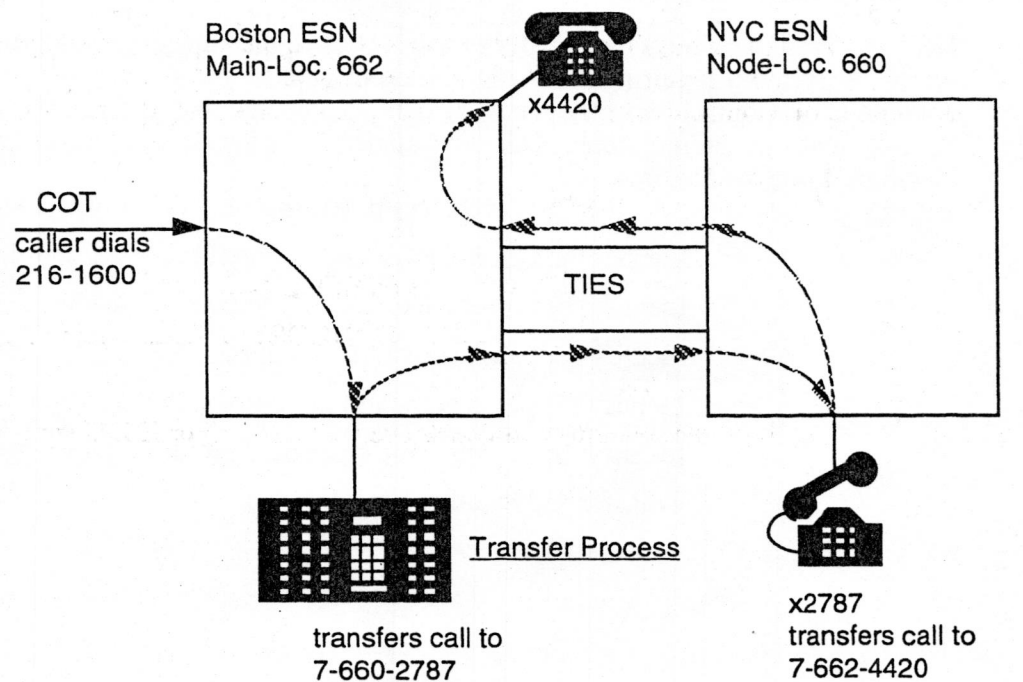
This feature improves the operation of the existing Call Transfer feature between two Meridian 1 switches when a call is transferred back to the originating switch. The regular Call Transfer feature requires two TIE trunks to complete the call. With Network Transfer, the call is transferred back to the originating switch via a TIE trunk of the same trunk group. The originating switch completes the transfer and the TIE trunks are dropped.

NETWORK TRANSFER PARAMETERS

- The Network Transfer (NXFR), Network Signaling (NSIG), and Network Class of Service (NCOS) packages must be equipped at both Meridian 1 switches.
- Routes must be configured with ESN3 or ESN5 signaling.

GK Glass Products Inc.

Figure 1



MODULE 22**OBJECTIVES**

Network Transfer allows the transfer of a call back to the adjacent switch from which it originates without requiring the use of two tie trunks.

Satellite Link Control prevents a network call from connecting to more than one communications satellite trunk. This module describes the Satellite Link Control and Network Transfer features.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of Satellite Link Control.
- Identify the correct definition of Network Transfer.
- Identify the parameters and limitations of Satellite Link Control.
- Identify the parameters and limitations of Network Transfer.
- Identify the prompts and responses required to provision Network Transfer and Satellite Link Control.

MODULE 22

**DESCRIBING NETWORK
TRANSFER AND SATELLITE
LINK CONTROL**

MODULE 23

**DESCRIBING OFF-HOOK
QUEUING IN AN ESN**

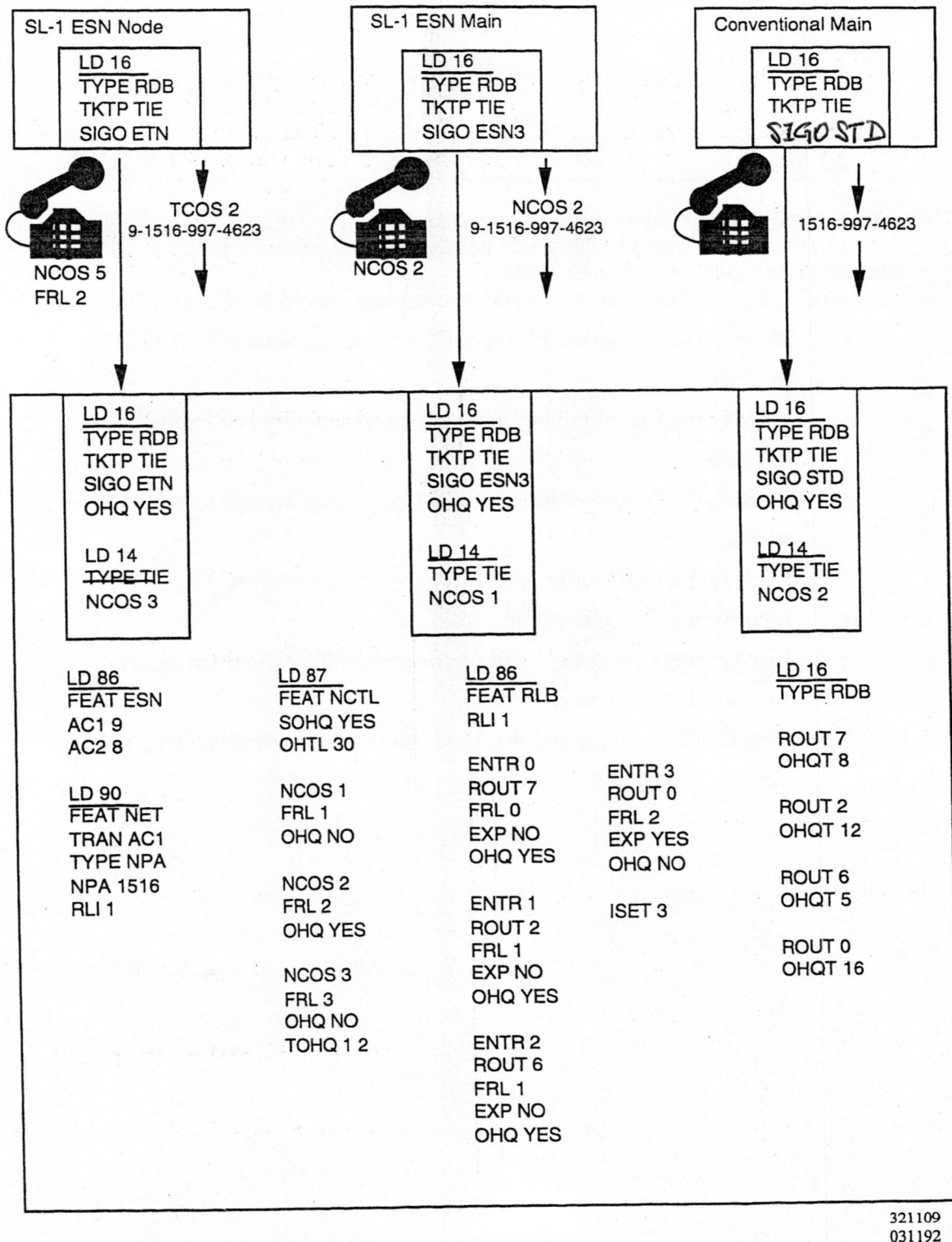
MODULE 23

OBJECTIVES

The OHQ feature may be accessed by station users at another M 1 Node, ETN, M 1 ESN Main, or Conventional Main. This module describes the purpose and parameters of Off-Hook Queuing Node to Node and Main to Node.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of OHQ Node to Node and OHQ Main to Node.
- Identify the four eligibility tests and the availability test for OHQ Node to Node.
- Identify the four eligibility tests and the availability test for OHQ Main to Node.
- Identify the OHQ Offer.
- Identify the OHQ threshold.
- List the steps the system will perform after the OHQ timer expires.
- Identify the limitations of OHQ.
- Identify the prompts and responses required to provision OHQ in an ESN.



*OHQ = Off-Hook Queuing

- There are currently 10 priority 3 calls in queue against Route 7
- There are currently 4 priority 3 calls in queue against Route 2
- There are currently 5 priority 3 calls in queue against Route 6
- There are currently 2 priority 3 calls in queue against Route 0

Figure 1

DEFINITION

Off-Hook Queuing allows a station user who encounters all trunks busy in the ISET at the serving Node or ESN Main to remain off-hook while the system searches the ISET for an idle trunk. When an idle trunk is found, the call completes. If an idle trunk is not found within an off-hook time limit, the system will search the ESET for an idle trunk to which the user has access. If an idle trunk is found, the call completes. If no idle trunk is found in the ESET, the call is blocked.

The OHQ feature may be extended to a user at an M1 ESN Node; M1 ESN Main; ETN; or a Conventional Main placing calls through either an M1 ESN Node or an M1 ESN Main.

PARAMETERS

- OHQ package must be equipped at the serving Node or ESN Main.
- Maximum time a user is allowed to OHQ is one minute.
- OHQ offer is one burst of tone.
- OHQ is allowed only on the ISET.
- Call must pass OHQ eligibility and availability tests before it is allowed to enter the OHQ.
- Call entering the OHQ will be assigned a priority of three.

OHQ ELIGIBILITY

BARS/NARS calls may be placed in the OHQ if all trunks in the ISET are busy and the following parameters are met:

ETN NODE TO M-1 ESN NODE

- OHQ feature is turned on for the customer at the serving Node.
- The TCOS/TCM sent is allowed to access OHQ.
- At least one entry in the ISET to which the user has access allows OHQ.
- The incoming tie route is allowed to access the OHQ feature.

M-1 ESN NODE TO M-1 ESN NODE

- OHQ feature is turned on for the customer at the serving Node.
- The NCOS sent from the originating ESN Node is defined at the terminating Node as allowing OHQ.
- At least one entry in the ISET to which the user has access allows OHQ.
- The incoming tie route is allowed to access the OHQ feature.

M-1 ESN MAIN TO M-1 ESN NODE

- OHQ feature is turned on for the customer at the serving Node.
- The NCOS sent from the ESN Main is defined at the Node as allowing OHQ.
- At least one entry in the ISET to which the user has access allows OHQ.
- The incoming tie route is allowed to access the OHQ feature.

CONVENTIONAL MAIN TO M-1 ESN NODE

- OHQ feature is turned on for the customer at the serving Node.
- The NCOS of the incoming tie trunk is defined at the Node as allowing OHQ.
- At least one entry in the ISET to which the user has access allows OHQ.
- The incoming tie route is allowed to access the OHQ feature.

M-1 ESN NODE TO M-1 ESN MAIN

- OHQ feature is turned on for the customer at the serving Main.
- The NCOS sent from the ESN Node allows OHQ.
- At least one entry in the ISET to which the user has access allows OHQ.
- The incoming tie route is allowed to access the OHQ feature.

AVAILABILITY

After a call has met all the OHQ eligibility tests at the M1 ESN Node, the system will perform the OHQ availability test. If either an OHQ availability or eligibility test is not passed, the system may then offer CBQ.

AVAILABILITY TEST

If the number of priority three calls in queue against at least one eligible ISET entry has not met the Off-Hook Queue Threshold assigned to that route the availability test will be passed.

OHQ OFFER

If all eligibility and availability tests are successful, the call originator is given OHQ tone (a one-second burst of 440 Hz). The call enters the OHQ against ISET entries only.

OHQ TIME LIMIT

The OHQ Time Limit is a customer-programmable time limit that may be set from two seconds to one minute, which specifies the maximum amount of time a caller may Off-hook Queue.

AUTOMATIC LEAST COST ROUTING AND OHQ

- A station user at an ETN or ESN Node places a call through an M1 ESN Node.
- The M1 Node translates the digits dialed and searches the ISET of a route list.
- All trunks in the ISET are busy.
- The network performs OHQ eligibility tests.
- If a call passes the OHQ eligibility test, the system then checks the OHQ availability tests.
- If a call fails the OHQ eligibility tests, the system checks CBQ eligibility.
- A one-second burst of tone advises the user that the call is being placed in the OHQ.
- The call queues at priority three against all eligible entries in the ISET that allow OHQ.
- The OHQ timer starts.
- If a trunk in the ISET becomes idle before the timer expires, the network seizes the trunk and completes the call.
- If no trunk becomes idle before the timer expires, the call is removed from the OHQ. The ESET is searched once for an idle, eligible trunk.
- If an idle, eligible trunk is found in the ESET, the call completes and no Expensive Route Warning Tone is given.
- If an idle, eligible trunk is not found, the call is sent to intercept treatment.



MODULE 24

**DESCRIBING COORDINATED
CALL BACK QUEUING**

MODULE 24

OBJECTIVES

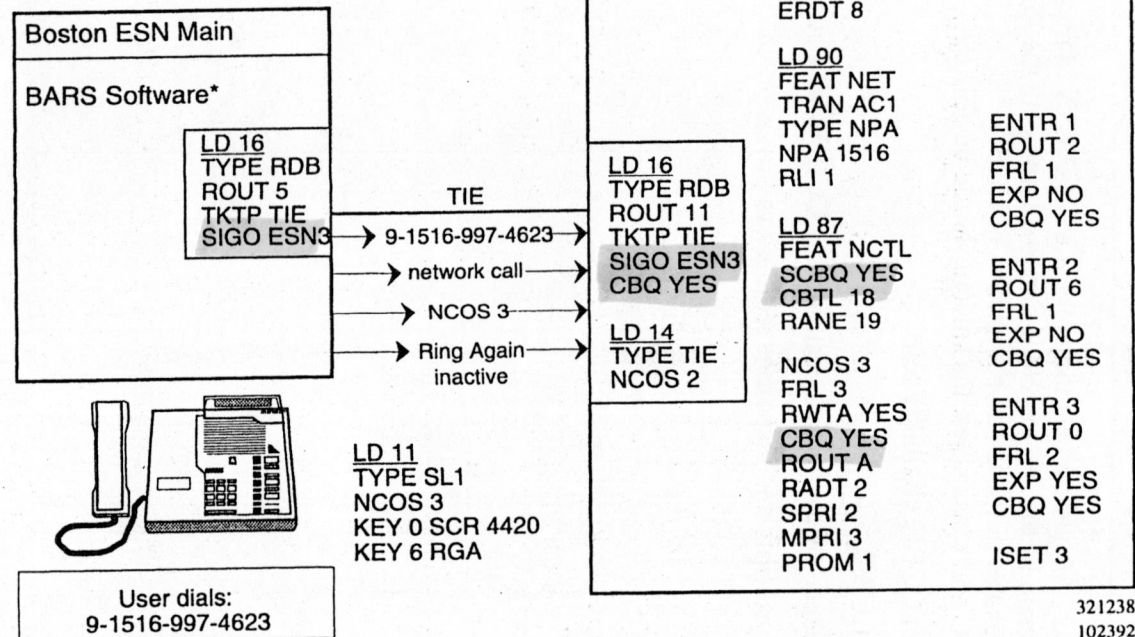
Coordinated Call Back Queuing (CCBQ) allows station users at an M-1 ESN Main to access the CBQ feature when blocked at the serving Node due to all trunks in the ISET being busy. This module describes the purpose and parameters of CCBQ.

Given the Student Guide, the QRC and class notes, the student should be able to:

- List the seven CCBQ eligibility tests.
- Identify the CCBQ offer.
- List the sequence of events that occur during CCBQ Call Back.
- Identify the prompts and responses required to provision CCBQ.

GK Glass Products Inc.

ESN Node (New York City)



LD 86
FEAT ESN
AC1 9

LD 90
FEAT NET
TRAN AC1
TYPE NPA
NPA 1516
RLI 4

LD 86
FEAT RLB
RLI 4

ENTR 0
ROUT 5
DMI 1
FRL 1

ENTR 1
ROUT 0
DMI 0
FRL 2

LD 87
FEAT NCTL
NCOS 3
FRL 3

LD 86
FEAT DGT
DMI 1
DEL 0
INST 9

DEFINITION

The Coordinated Call-Back Queuing (CCBQ) feature enables stations at an M-1 ESN Main to be offered CBQ when encountering all trunks busy in the ISET at the serving M-1 ESN Node. When a trunk becomes available at the M-1 ESN Node, the call originator at the M-1 ESN Main is alerted by a callback from the Node.

PARAMETERS

- M-1 ESN Node must have the following feature packages: NCOS, NSIG, FCBQ and MCBQ.
- M-1 ESN Main must have the following feature packages: NCOS, NSIG and FCBQ.

ELIGIBILITY

When a station at an M-1 ESN Main originates a network call through an ESN Node, the NCOS of the set, call type, and whether or not the station is allowed access to the Ring Again feature is transmitted to the M-1 ESN Node. When received by the Node, this NCOS number is used to determine CCBQ eligibility and is used for the duration of the call.

Before offering CCBQ to an M-1 ESN Main station, the following eligibility tests are performed. **The call must pass all tests.**

- The call has been found ineligible for OHQ.
- The CBQ feature is enabled for the customer at the serving M-1 ESN Node.
- The NCOS sent from the M-1 ESN Main is defined at the serving Node as permitting CBQ.
- At least one entry in the ISET (at the serving Node) to which the user has access allows CBQ.
- The user's telephone has access to the Ring Again feature.
- Ring Again is not active on the set.
- The incoming tie Route from the ESN Main is defined at the Node as allowing access to the CBQ feature.

OPTIONS

Two options for Examination of Route List Entries are defined by the call originator's NCOS, as sent from the M-1 ESN Main and as defined at the serving Node.

The first option, CBQ (I), means CBQ may be offered after only the ISET of a route list has been examined for an available route.

The second option, CBQ (A), means CBQ may be offered after both the ISET and ESET (all routes) of a route list have been examined.

In either case, **queuing is always initially on the ISET.**

CBQ(A) AND CCBQ

For call originations by an NCOS defined as CBQ(A) at the serving Node, the system examines the ISET and ESET for an available route. If an available route is found in the ESET and Expensive Route Warning Tone is enabled, three bursts of tone will be given to the user at the ESN Main. The system will delay in processing the call. During the delay time (from two to ten seconds), the user has the following three options:

- Refuse the expensive route by abandoning the call;
- Wait, and allow the call to complete over the expensive route;
- Activate the Ring Again feature to place call in the CBQ.

OFFER

The CCBQ offer and acceptance sequences are identical to those for stations at the ESN Node. After the optional recorded announcement and/or overflow tone are provided, the ESN Node transmits a signal to the ESN Main which will allow the activation of the Ring Again feature.

QUEUE IDENTIFICATION

When the call originator at the ESN Main activates Ring Again after a CBQ offer from the serving Node, the ESN Main will assign a unique queue identification number to the call. This number is transmitted to the ESN Node to indicate CCBQ acceptance at the M1 ESN Main. The call is then placed in a one-hour holding queue. At the ESN Node, the call along with its queue ID is placed into a trunk queue. The ESN Main to ESN Node tie trunk is released.

CBQ PRIORITY QUEUING AND CCBQ

CBQ Priority Queuing is the process by which calls are queued ^{A DIFERENÇA DE} against a trunk route by priority. Calls are assigned one of four priority levels (# 0-3). Calls may advance in queue after remaining in queue a specified length of time.

When a CCBQ call enters a trunk queue, the serving Node will use the NCOS sent from the ESN Main to determine Starting Priority, Maximum Priority and Promotion time.

CCBQ PRIORITY QUEUING PARAMETERS

The serving node must be equipped with the Priority Queuing package (PQUE).

ROUTE ADVANCE TIMER AND CCBQ

The Route Advance Timer (RADT) specifies the maximum amount of time a call remains in the CBQ against the ISET only. When the RADT expires, the system searches the ESET for an idle, eligible trunk.

When a CCBQ call enters a trunk queue, the serving Node will use the NCOS sent from the ESN Main (as defined at the Node) to determine the maximum amount of time the call will queue against the ISET only.

CCBQ CALLBACK

When an outgoing trunk is seized by the M1 ESN Node for a CCBQ call, slow outpulsing of digits is started to hold the trunk while a callback is made to the call originator at the M1 ESN Main. The ESN Node seizes an available tie trunk to the ESN Main, and transmits the 'queue identification' number of the call to the ESN Main. The ESN Main then initiates a callback to the call originator. Callback presentation to the call originator is as for standard CBQ callback.

If no tie trunks to the M1 ESN Main are idle, the outgoing trunk is released and may be offered to another call. The CCBQ call retains its position in the queue but is not offered another trunk until a tie trunk to the ESN Main becomes available.

When the call originator at the ESN Main accepts the CCBQ callback, answer supervision is sent from the ESN Main to the ESN Node. The ESN Node then completes the call.

If the call originated from a 500/2500 set, and the set is busy when the M-1 ESN Node initiates a CCBQ callback, a signal is transmitted from the ESN Main to the Node. The Node releases the outgoing trunk and places the CCBQ call into a holding queue for five minutes. No attempt is made to seize another outgoing trunk for the call until the holding time expires.

This process occurs only once. If the originating station is still busy, the CCBQ is cancelled at the ESN Node. No indication is given to the call originator of CCBQ cancellation. CCBQ callback to a busy M-1 station is as for CBQ callback to busy SL-1 set.

The call originator at the ESN Main may cancel the CCBQ call at any time. The M-1 ESN Node is not aware of the cancellation until the CCBQ callback is attempted.

HOLDING QUEUE

To prevent CCBQ calls from remaining indefinitely in the holding queue at the ESN Main, the ESN Main sets a time limit of one hour for CCBQ calls. When this time limit expires, the CCBQ call is cancelled automatically.

AUTOMATIC LEAST COST ROUTING AND CCBQ

- A station user at an ESN Main places a call through a Node.
- The ESN Main sends the digits dialed, the NCOS of the set, and Ring Again status to the ESN Node.
- The ESN Node translates the call and finds all trunks busy in the ISET.
- The ESN Node will check the seven eligibility tests:
 - Call ineligible for OHQ
 - CBQ turned on for the customer
 - CBQ turned on for the NCOS sent
 - At least one entry in the ISET allows CBQ
 - Set is allowed access to the Ring Again feature
 - Ring Again is not active on the set
 - Incoming tie Route allows CBQ
- If at least one of the eligibility tests fails, the system will search the ESET for an idle trunk to which the user has access (via FRL, TOD, and FCI). If one is found, the call completes without a CCBQ offer.
- If all eligibility tests pass, the system will check to see if the NCOS is defined as CBQ(A) or CBQ(I).
- If the call originator is CBQ(I), the system will offer CCBQ after the ISET is checked. If the call originator is CBQ(A), the system will check both the ISET and ESET before offering CCBQ.
- M-1 ESN Node offers CCBQ to the call originator. (RAN and overflow tone or overflow tone only).
- Call originator at the M-1 ESN Main accepts CCBQ by activating Ring Again.
- M-1 ESN Main sends signal to the Node to indicate acceptance.
- Main assigns a queue identification number and sends the Queue ID to the Node.
- Call enters a one-hour holding queue at the Main and enters the trunk Queue at the Node (at Starting Priority). The Route Advance timer starts at the Node.
- Node searches for an idle trunk.
- When an idle trunk is found the Node initiates a callback to the ESN Main station.

CCBQ CALLBACK

- Node seizes an outgoing trunk at the Node and starts slow outpulsing.
- Node seizes a tie trunk to the Main and sends the Queue ID.
- Main receives the Queue ID and indicates Ring Again callback to station.
- If all tie trunks are busy to the Main, the Node drops the outgoing trunk and will not call the user back until a tie trunk becomes available. (The call retains its place in the trunk queue).
- If the callback is to a busy 500/2500 set, the Node drops the outgoing trunk and puts the call into a five-minute holding Queue. The Node attempts the callback again after five minutes. If the set is still busy, the CCBQ is cancelled.
- If the M-1 set or 500/2500 set is idle, the set receives callback in the normal manner.
- To accept the CCBQ callback, a 500/2500 set goes off-hook; an M-1 set activates Ring Again.
- Main sends the callback acceptance to the Node and the call completes.

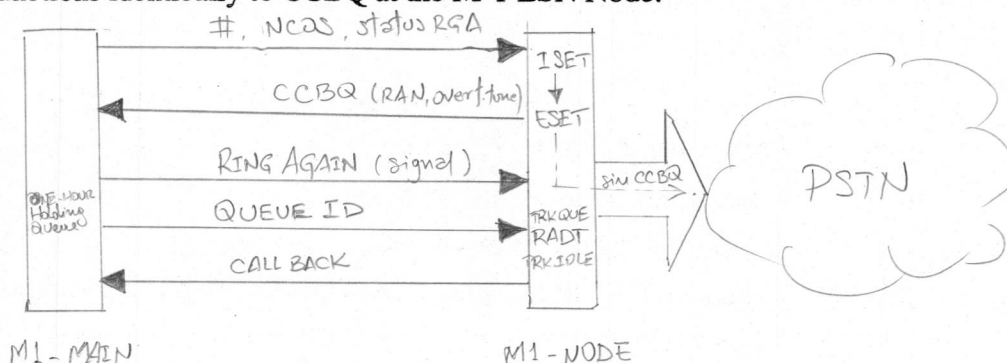
FEATURE INTERACTIONS

M-1 Initialize. If initialization occurs at the M-1 ESN Node or M-1 ESN Main, CCBQ calls are cleared. To prevent calls from remaining indefinitely in the holding queue at the M-1 Main, the M-1 Main sets a time limit of one hour for CCBQ calls.

Attendant Functions. Attendants at an M-1 Main are not offered CCBQ because the Ring Again feature is not supported at M-1 attendant consoles.

COORDINATED CALLBACK QUEUING AGAINST MAIN

The Coordinated Callback Queuing Against Main (CCBQ AM) feature enables stations at M-1 Nodes to be offered CCBQ for network calls which encounter all trunks busy in the ISET at the M-1 ESN Main. When facilities become available at the M-1 ESN Main, the call originator at the M-1 Node is alerted by a callback from the M-1 Main. CCBQAM otherwise functions identically to CCBQ at the M-1 ESN Node.





MODULE 25

**DESCRIBING CALL BACK
QUEUING TO
CONVENTIONAL MAIN**

MODULE 25

OBJECTIVES

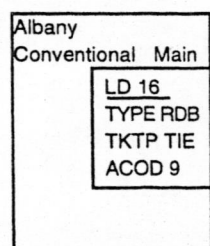
The Call Back Queuing to Conventional Main feature (CBQCM) allows a station user at a Conventional Main to access the CBQ feature if a call is blocked at the serving Node due to all trunks busy in the ISET at the serving Node.

Given the Student Guide, the QRC and class notes, the student should be able to:

- List the five CBQCM eligibility tests.
- Identify the sequence of events that occur during a CBQCM call back.
- Identify the prompts and responses required to provision CBQCM.

GK Glass Products Inc.

ESN Node- New York City



TIE

1516-997-4623



DN 7477 dials
9-1516-997-4623
hears Recorded Announcement
dials 7477
goes on-hook

CBQ* = Call Back Queuing

LD 16
TYPE RDB
ROUT 10
TKTP TIE
INST 9
CBQ YES
NDIG 4

LD 14
TYPE TIE
NCOS 2

LD 86
FEAT ESN
AC1 9
AC2 8

LD 90
FEAT NET
TRAN AC1
TYPE NPA
NPA 1516
RLI 1

LD 87
FEAT NCTL
SCBQ YES
CBTL 20
RANC 46

NCOS 2
FRL 2
CBQ YES
ROUT 1
RADT 6
SPRI 1
MPRI 3
PROM 2

LD 86
FEAT RLB
RLI 1

ENTR 0
ROUT 7
FRL 0
EXP NO
CBQ YES

ENTR 1
ROUT 2
FRL 1
EXP NO
CBQ YES

ENTR 2
ROUT 6
FRL 1
EXP NO
CBQ YES

ENTR 3
ROUT 0
FRL 2
EXP YES
CBQ YES

ISET 3

121108
062689

Figure 1

DEFINITION

The Call Back Queuing to Conventional Main (CBQCM) feature enables stations at a Conventional Main to be offered CBQ when encountering all trunks busy in ISET at the serving M1 ESN Node. When a trunk becomes available at the M1 ESN Node, the call originator at the Conventional Main is alerted by a call back from the Node.

PARAMETERS

- M1 ESN Node must have the following feature packages: NCOS, CBQ, MCBQ.

ELIGIBILITY

When a station user at a Conventional Main originates a network call through an M1 ESN Node, the NCOS assigned to the incoming tie trunk is used to determine CBQCM eligibility and is used for the duration of the call. Before offering CBQCM to a Conventional Main station, the following eligibility tests are performed. The call must pass all tests.

- The call has been found ineligible for OHQ.
- The CBQ feature is enabled for the customer at the serving M1 ESN Node.
- The NCOS of the incoming tie trunk is defined at the serving Node as permitting CBQ.
- At least one entry in the ISET (at serving node) accessible to the user allows CBQ.
- The incoming tie Route from the Conventional Main is defined at the Node as allowing access to the CBQ feature.

OPTIONS

Two options for Examination of Route List Entries are defined by the incoming tie's NCOS.

The first option, CBQ(I), means that CBQ may be offered only after the ISET of a route list has been examined for an available route.

The second option, CBQ(A), means that CBQ may be offered after both the ISET and ESET (all routes) of a route list have been examined.

In either case, **queuing always occurs initially on the ISET only.**

OFFER

The CBQCM Offer to the call originator at a Conventional Main consists of an optional recorded announcement followed by special dial tone. (Special dial tone is three bursts of dial tone followed by steady dial tone.) (The announcement and tones are provided by the M-1 ESN Node.)

To accept the CBQCM Offer, the call originator dials the extension number associated with the telephone being used for the call. When the last digit of the extension number is dialed, a confirmation tone (three 256ms bursts of dial tone) is sent from the M-1 ESN Node to the call originator.

The call is placed in the CBQ at the ESN Node when the call originator goes on hook. The CBQCM Offer may be refused by going on-hook any time before the last digit of the extension number is dialed, or by remaining off-hook for longer than thirty seconds after receipt of confirmation tone.

If the CBQCM Offer is not accepted within thirty seconds, the caller is given line lockout intercept treatment and the call is disconnected.

CBQ PRIORITY QUEUING AND CBQCM

CBQ Priority Queuing is the process by which calls are queued against a trunk route by priority levels (#0-3). Calls may advance in queue after remaining in queue a specified length of time.

When a CBQCM call enters a trunk queue, the serving Node will use the NCOS of the incoming tie trunk from the Conventional Main to determine Starting Priority, Maximum Priority and Promotion time.

CBQCM PRIORITY QUEUING

The serving Node must be equipped with the Priority Queuing package.

ROUTE ADVANCE TIMER AND CBQCM PARAMETERS

The Route Advance Timer (RADT) specifies the maximum amount of time a call remains in the CBQ against the ISET. When the RADT expires, the system searches the ESET for an idle, eligible trunk.

When a CBQCM call enters a trunk queue, the serving Node will use the NCOS assigned to the incoming tie trunk (defined at the Node) from the Conventional Main to determine the maximum amount of time the call will queue against the ISET only.

CBQCM CALLBACK

When an outgoing trunk becomes available at the M-1 ESN Node, it is seized and slow outpulsing is started. The M-1 ESN Node then seizes a tie trunk to the Conventional Main and outpulses the extension number of the call originator. The call originator must answer the call back before slow outpulsing is completed; otherwise, the call back is temporarily cancelled and the outgoing trunk is released.

If no tie trunks are currently available to the Conventional Main, the M-1 Node releases the outgoing trunk. The CBQCM call retains its position in the queue but is not offered another outgoing trunk until a tie trunk to the Conventional Main becomes available. When the call originator answers the CBQCM callback, answer supervision must be transmitted from the Conventional Main to the M-1 ESN Node. Upon receipt of answer supervision from the Conventional Main, the M-1 ESN Node transmits a tone (three 256ms bursts of dial tone) to notify the call originator that the call is a CBQCM callback, and completes the call.

If the call originator's station is busy, or the originator does not answer when the callback is placed, the M-1 ESN Node places the call in a suspended state for five minutes. After five minutes, another callback is attempted if an outgoing trunk is free. If the station which originated the call is still busy, or does not answer, the M1 ESN Node cancels the callback.

- Stations at a Conventional Main cannot activate CBQCM after receiving Expensive Route Warning Tone.
- Tie trunks from the Conventional main must be two way and provide answer supervision.
- Stations at Conventional Mains are allowed to enter multiple Call-Back Queues.

AUTOMATIC LEAST COST ROUTING AND CBQCM

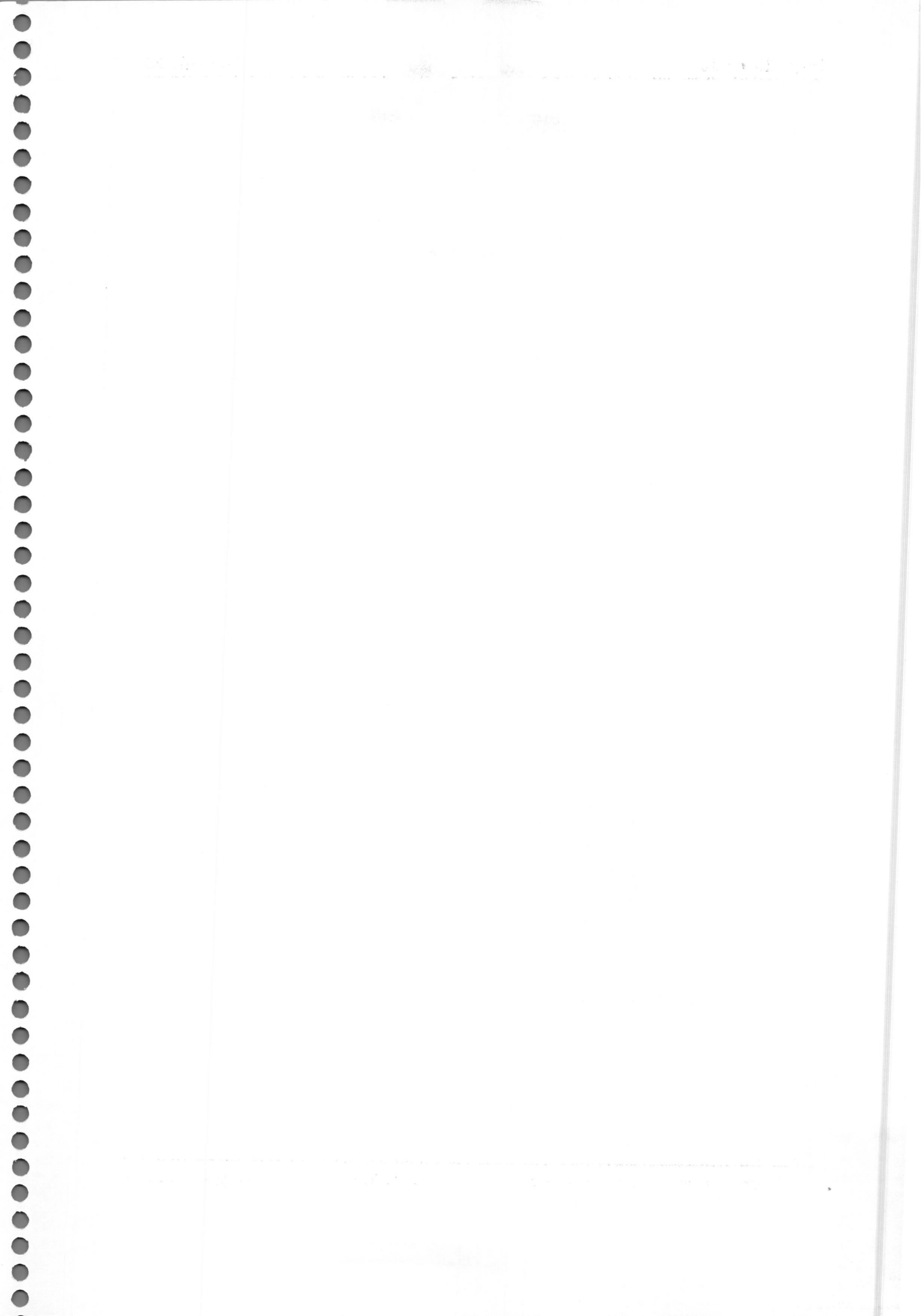
- A station user at a Conventional Main places a call through a Node.
- The Conventional Main sends the digits dialed by the station user to the M1 ESN Node.
- The ESN Node translates the call and finds all trunks busy in the ISET.
- The ESN Node will perform the five eligibility tests.
 - Call is ineligible for OHQ.
 - CBQ turned on for the customer.
 - CBQ turned on for the NCOS of the tie trunk.
 - At least one entry in the ISET allows CBQ.
 - The incoming tie Route allows CBQ.
- If at least one of the eligibility tests fail, the system will search the ESET for an idle trunk to which the user has access (via FRL, TOD and FCI). If one is found, the call completes with no CBQCM Offer.

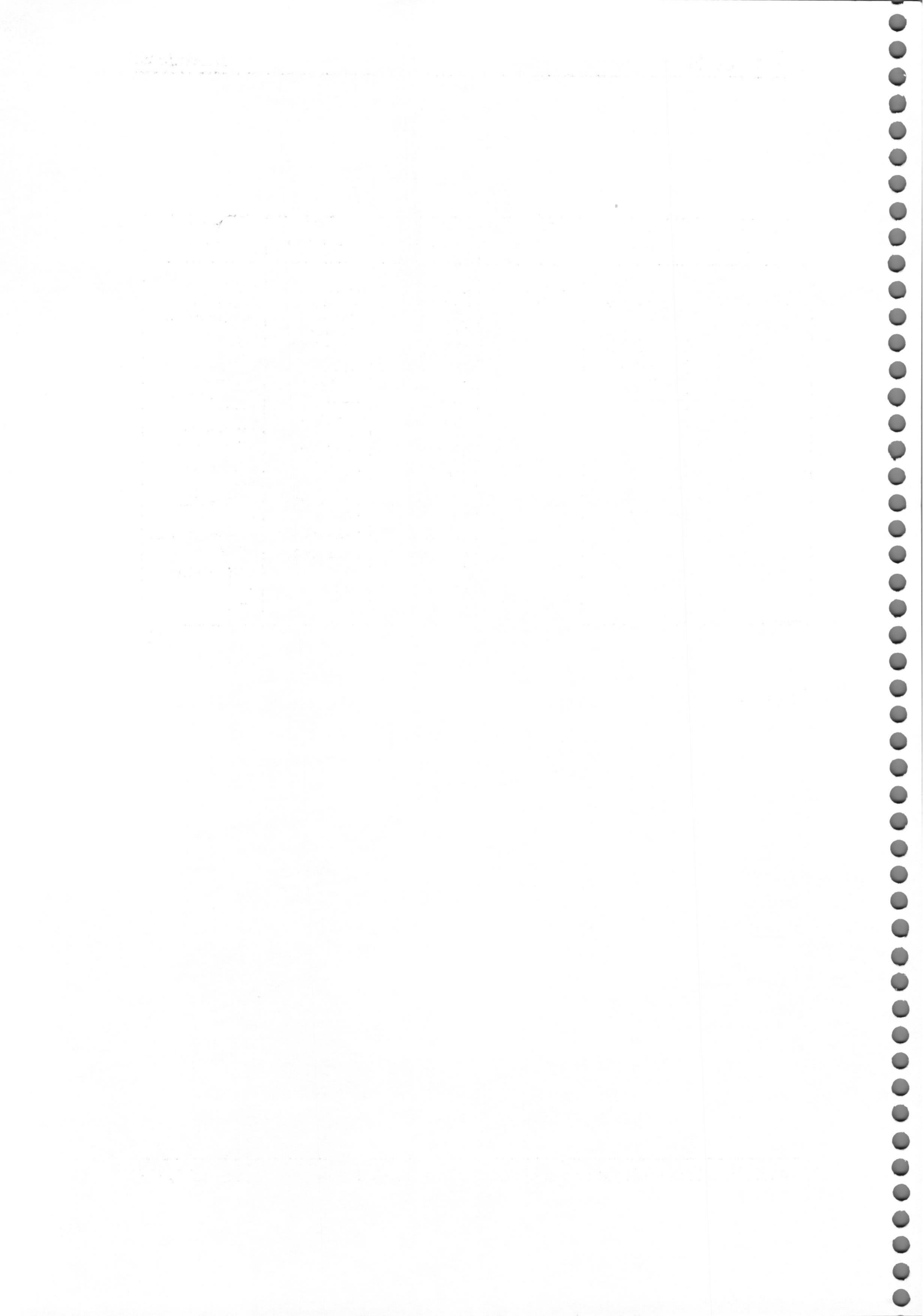
- If all eligibility tests are passed, the system will check to see if the NCOS is CBQ(A) or CBQ(I).
- If the call originator is CBQ(I), the system will offer CBQCM after the ISET is examined. If the call originator is CBQ(A), the system will examine the ISET and ESET before offering CBQCM.
- The M1 ESN Node offers CBQCM to the call originator (RAN + special dial tone or special dial tone only).
*Special dial tone is three bursts of dial tone followed by steady dial tone.
- The call originator at the Conventional Main accepts the CBQCM offer by dialing the DN of the originating set.
- Confirmation tone is returned to the Conventional Main station user (three bursts of dial tone).
- The call enters the trunk queue at the starting priority defined for the incoming tie's NCOS.
- The Route Advance timer starts when the call enters the trunk queue at the Node.
- When an idle trunk is found, the Node initiates a callback to the Conventional Main station.

CBQCM CALLBACK

- The Node seizes the outgoing trunk at the Node and starts slow outputting of digits.
- The Node seizes a tie trunk to the Conventional Main and output pulses the DN of the call originator.
- If all tie trunks are busy to the Conventional Main, the Node drops the outgoing trunk and will not call the station back until a tie trunk becomes free. (The call retains its place in the trunk queue.)
- If the set at the Conventional Main is busy or does not answer the call-back, the Node drops the outgoing trunk and puts the call into a five-minute holding queue. The Node tries the callback again after five minutes. If the set is still busy or does not answer, the CBQCM is cancelled.

- To accept the CBQCM callback, the user goes off-hook.
- The Node sends three bursts of dial tone to the user.
- Call completes.





TONES

Expensive Route Warning Tone	Auth. code last	Off-hook Queue	Call back Queue	CCBQ (ESN Main)	CCBQCM (conv. main)
3 256ms bursts of 440Hz	10 bursts of dial tone followed by steady dial tone or optional RAN +10 bursts of dial tone followed by steady dial tone	1 sec burst of 440 Hz	<u>CBQ (I)</u> Overflow tone OR Optional RAN + overflow tone <u>CBQ (A)</u> <u>ESET busy OR not allowed</u> overflow tone OR Optional RAN + overflow tone <u>ESET idle RWTA</u> =Yes 3 bursts of tone <u>ESET idle RWTA</u> =No NONE	<u>CBQ (I)</u> Overflow tone OR Optional RAN + overflow tone <u>CBQ (A)</u> <u>ESET busy OR not allowed</u> overflow tone OR Optional RAN + overflow tone <u>ESET idle RWTA</u> =Yes 3 bursts of tone <u>ESET idle RWTA</u> =No NONE	<u>CBQ (I)</u> Optional RAN + interrupted dial tune OR Interrupted dial tone <u>CBQ (A)</u> <u>ESET busy OR not allowed</u> Optional RAN + interrupted dial tune OR Interrupted dial tone <u>ESET idle RWTA</u> =Yes cannot enter CBBQ after hearing ERWT <u>ESET idle RWTA</u> =No NONE

275002
062789

Figure 3

DIGIT DISPLAY

When an M1 phone, digital phone, or attendant console is equipped with a Digit Display, digits dialed by a station user are displayed exactly as they are dialed.

The NARS feature of Digit Manipulation does not alter the way the digits are viewed in the digit display.

The station user sees the number just as he dials them, not as they are outpulsed.

CDR

Prior to Release 12, the "digits dialed" field of a CDR report represented digits as dialed by the station user, the only alteration to which being the replacement of the NARS access code with the trunk route access code of the facility used to complete the call.

As of Release 12, the customer may select a digits dialed or a digits outpulsed field on a per route basis.

	Station or DISA	Attendant-Extended or Originated	Tie Trunk	DID	
NINV	(OVF) ATN RAN	(OVF) ATN RAN	(OVF) ATN RAN	OVF (ATN) RAN	• No translation table • No Network Control data block
NITR	(OVF) ATN RAN	(OVF) ATN RAN	(OVF) ATN RAN	OVF (ATN) RAN	• Digit sequence dialed not in translation table
NRES	(OVF) ATN RAN	(OVF) ATN RAN	(OVF) ATN RAN	OVF (ATN) RAN	• Initial digit sequence located in translation table, but subsequent digit sequence blocked via SDRR
NBLK	(OVF) ATN RAN	(OVF) ATN RAN	(OVF) ATN RAN	OVF (ATN) RAN	Call blocked via: • TOD • FCI • FRL • All trunks busy • CLS • TGAR • SAT • RACC (LD 93) Multi-Tenant

Network Intercept Treatment

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Figure 2

MULTI-TENANT SERVICE

If a customer is equipped with Multi-Tenant Service software, the database may be administered so that each individual tenant has access only to selected trunk routes. The NARS software will examine this database when determining a user's entry eligibility. If the Multi-Tenant Service database denies a user access to a given trunk route, he will be found ineligible for any Route List entry referencing that route, although all other eligibility criteria may have been met.

INTERCEPT

Calls that cannot be completed because of call restrictions or dialing irregularities may be routed to overflow tone, recorded announcement, or the attendant. Separate treatments may be specified for calls from four categories of originating party:

- Station or DISA calls
- Attendant extended calls
- TIE trunk calls
- DID trunk calls

Four intercept situations are reserved for NARS calls. They are:

- NARS Invalid (NINV): there is no Translation Table or Net-work Control Data Block defined for the customer.
- NARS Invalid Translation(NITR): the digits dialed by the user have not been defined in a Translation Table.
- NARS Restricted (NRES): the call is blocked via SDRR DENY or SDRR ITED.
- NARS Blocked (NBLK): the call is blocked at the Route List level due to any combination of:
 - TOD
 - FCI
 - FRL
 - TGAR
 - CLS
 - Satellite Link Control
 - Multi-Tenant Service
 - All trunks busy, no queuing available

ACCESS RESTRICTION EXAMPLE 2

A station user is assigned a Class of Service of TLD, a TGAR that denies access to the WATS route, and an NCOS of 3.

- NARS/BARS is programmed to examine TGARs.
- NCOS 3 is assigned a Facility Restriction Level of 3.
- The station user dials AC1+1+216+398+1236.
- Calls to NPA 1216 go to Route List 7.
- Route List 7

Entry 0

Route: FEX

Facility Restriction Level: 0

Entry 1

Route: WATS

Facility Restriction Level: 2

Entry 2

Route: COT

Facility Restriction Level: 5

ISSET: 2

- The user's Class of Service denies this call type on COT and FEX routes only.
- The user does not have access to entry 0, because the Class of Service TLD does not allow 0 or 1+ dialing on a COT or FEX route.
- The user does not have access to entry 1, because the NARS/BARS software is programmed to examine TGARS. The user's TGAR does not allow access to the WATS route.
- The user does not have access to entry 2 for two reasons:
 - The user's Class of Service does not allow the call type on a COT route.
 - The NCOS does not allow access to the entry.
- The call does not complete.

NO ACCESS → X
 TARG = TGAR

TRUNK GROUP ACCESS RESTRICTION (TGAR)

TGAR allows a customer to allow or deny a station direct access to specific trunk routes. The customer may decide to have NARS ignore TGARs when determining a user's entry eligibility. In this case, TGARs and TARGs are used to deny stations direct access to trunk routes, thus forcing the station user to place calls through NARS.

The customer may decide to have NARS examine TGARs when determining a user's entry eligibility. In this case, before a user can gain access to a route list entry, the user's TGAR and NCOS must allow access and the CLS must allow the call type.

ACCESS RESTRICTION EXAMPLE 1

- A station user is assigned a Class of Service of CTD, a TGAR that denies direct access to all routes, and an NCOS of 3.
- NARS/BARS is programmed to **ignore** TGARs.
- NCOS of 3 is assigned an FRL of 3.
- The station user dials AC1+1+216+398+1236.
- Calls to the NPA 1216 go to Route List 7.
- Route List 7

Entry 0

Route: Band 5

Facility Restriction Level 2

Entry 1

Route: COT

Facility Restriction Level: 4

ISSET: 1

- The user's class of Service allows the call type on both routes.
- The user's TGAR will be ignored by NARS/BARS.
- The Facility Restriction Level of the user's NCOS allows access to entry zero only.
- For this user, the call may complete over entry zero only.

	UNR	CTD	TLD	SRE	FRE	FR1	FR2
Incoming Trunk Calls	YES	YES	YES	YES	VIA CALL MODIFICATION ** NO	NO	NO
Outgoing Non-Toll Trunk Calls	YES	YES	YES	YES VIA ATTENDANT OR STATION *	YES VIA STATION *	NO	NO
Outgoing Toll Trunk Calls (0 or 1+ as 1st or 2nd digit on COT or FEX)	YES	YES VIA BARS/NARS NO DIRECT ACCESS	YES VIA ATTENDANT OR STATION * NO DIRECT ACCESS	NO DIRECT ACCESS	NO DIRECT ACCESS	NO	NO
To/From Tie Trunk	YES	YES	YES	YES	YES	YES	NO
To/From Internal	YES	YES	YES	YES	YES	YES	YES
BARS/NARS Calls TGAR= No	USES NCOS ONLY	USES NCOS ONLY	USES NCOS AND CLS	USES NCOS AND CLS	USES NCOS AND CLS	USES NCOS AND CLS	USES NCOS AND CLS
BARS/NARS Calls TGAR= Yes	USES NCOS AND TGAR	USES NCOS AND TGAR	USES NCOS, CLS AND TGAR	USES NCOS, CLS AND TGAR	USES NCOS, CLS AND TGAR	USES NCOS, CLS AND TGAR	USES CLS

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* VIA CALL MODIFICATION: TRN, CONF, ETC.

** TAFAS, CALL PICKUP, TRN

Figure 1

MODULE 26**OBJECTIVES**

This module describes how the various NARS features interact with non-NARS features. Given the Student Guide and class notes, the student should be able to identify how:

- Class-of-Service interacts with the NARS software.
- Trunk Group Access Restriction interacts with the NARS software.
- CDR interacts with the NARS software.
- Digit Display interacts with the NARS software.
- Multi-Tenant Service interacts with the NARS software.

INTRODUCTION

Six non-NARS/BARS features interact directly with NARS/BARS software. These features are:

- Class of Service ✓
- Trunk Group Access Restriction ✓
- Intercept
- Digit Display ✓
- CDR ✓
- Multi-Tenant Service

ACCESS RESTRICTION

Each station or tie trunk in the system will be assigned three access restrictions.

- 1 • Class of Service
- 2 • Trunk Group Access Restriction (TGAR)
- 3 • Network Class of Service (NCOS)

CLASS OF SERVICE

Allows a customer to define a station user's degree of access to the exchange network. One parameter of Class of Service interacts directly with NARS: CTD (conditionally toll-denied).

When a station user with an assigned Class of Service of CTD places a call through NARS, the system will use the station's NCOS to determine entry eligibility. The remaining six categories of Class of Service remain unchanged when a station user places a call through NARS.

MODULE 26

**NARS/BARS INTERACTIONS
WITH NON NARS/BARS FEATURE**

MODULE 27**OBJECTIVES**

After installing a NARS database, it is necessary to isolate installation errors that are causing legitimate calls to block. This module describes the Call Trace overlay program and the data administration programs required to trace a call.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify overlay programs required to print NARS data.
- Identify commands required to trace a call using overlay program 80.
- Identify the prompts and responses required to provision Call Trace.

INTRODUCTION

Once you finish installing NARS for a customer, it is important to verify your work. Also, it is necessary to go back and locate installation errors that are causing legitimate calls to block. Printing the data blocks and tracing problem calls are the final steps for verifying your work.

PRINT ROUTINES

Information implemented using overlay programs 10, 11, 12, 13, 14, 15, 16, 17, and 18 is printed using designated print routines (overlay programs 20, 21 and 22) (Figure 1):

	Overlay 20	Overlay 21	Overlay 22
Overlay 10	X		X
Overlay 11	X		X
Overlay 12	X		
Overlay 13	X		
Overlay 14	X		
Overlay 15		X	
Overlay 16		X	
Overlay 17			X
Overlay 18	X		

Figure 1

Overlay 20 is used to print:

- NCOS, TGAR, and CLS assigned to 500/2500 sets (from Overlay 10).
- NCOS, TGAR and CLS assigned to multi-line sets (from Overlay 11).
- RTC key assigned to attendant console (from Overlay 12).
- NCOS, TGAR and CLS assigned to tie trunks (from Overlay 14).
- NCOS assigned to System Speed Call lists (from overlay 18).

Overlay 21 is used to print:

- NCOS assigned to attendant console (from Overlay 15).
- Intercept treatment for NARS calls (from Overlay 15).
- OHQ threshold, OHQ and CBQ eligibility, conversion and signaling defined for each trunk route (from Overlay 16).

Overlay 22 is used to print:

- TNs to which any DN is assigned (from overlays 10 and 11).
Information on equipped packages, as well as the version and issue of the tape or disk, is also printed using overlay program 22.

Self-Printing Overlays

Overlay programs numbered 23 and above may be used to enter new information. You may also use the same overlays to print the existing data.

NARS-RELATED "SELF-PRINTING" PROGRAMS:**Overlay Program 24**

- TGAR, NCOS, and COS assigned to the DISA DN.

Overlay Program 86

- ESN data block.
- Digit Manipulation Tables.
- Route list indexes.
- Incoming Trunk Group Exclusion indexes.

Overlay Program 87

- Network Control Data Block.
- Free calling Area Screening Tables.
- Coordinated Dialing Plan Steering Codes

Overlay Program 88

- AUB Data Block.
- AUT Data Block.

Overlay Program 90

- Network Translation.

Overlay Program 93

- Tenant to route access.

PURPOSE OF CALL TRACE

When a customer has consistent problems with one or more apparently legitimate calls not completing, each call should be traced to determine where, when, and whether the call is blocking in NARS.

The one thing which cannot be determined from a call trace is which trunks were busy when the call was placed.

EXAMPLE 1

If both OHQ and CBQ are denied, and all trunks in a Route List are busy, the call is blocked.

EXAMPLE 2

If the network attempts to offer CBQ and the station user doesn't have Ring Again, the call is blocked.

EXAMPLE 3

For a given call, if the FRL of the NCOS is too low to be eligible for any entry in a Route List, the call is blocked.

EXAMPLE 4

If the NPA dialed by a station user is not found in the appropriate Translation Table, the call is blocked.

BEFORE YOU TRACE A CALL

Before you begin to trace a call, you must find out three things:

- The number dialed.
- The DN of the originating station.
- When the call was placed.

These three pieces of information are used to help trace the call effectively. Additionally, it is helpful to check the console to determine whether:

- The RTC key was activated.
- Any trunk group busy keys were activated.
- The network time was accurate when the call was placed.

HOW TO TRACE A CALL

The most thorough way to trace a call is:

- Print all the information required.
- Examine the printed information in the same order that a call is processed through NARS/BARS.
- Look for data base installation oversights that may cause blocking of a call which should otherwise complete.

INFORMATION NEEDED TO TRACE A CALL**AUT (88)**

- If an Authcode was entered, check its validity.
- Note the Classcode associated with the Authcode.

AUB (88)

- Find Classcode associated with the Authcode and note the new NCOS, TGAR, and Class of Service that apply to the call.

ESN (86)

- Check the access code to confirm that the call is accessing NARS.
- Check to see if dial tone is provided after the access code.
- Check to see if ERWT is enabled for this customer.
- Find and note the TOD Schedule that coincides with the time of the call.
- Check to see if Routing Control is in effect, and if so, note the original and alternate NCOS mapping.
- Check to see if TGAR is being observed or ignored in NARS.

DNB (22 or 20)

- Find the TN assigned to the originating station.

TNB (20)

- Find the NCOS assigned to the originating station.
- Find the Class of Service of the originating station.
- Find the TGAR (if applicable) of the originating station.
- Find the NCOS, TGAR, and class of service of the DISA DN (if applicable).

NET (90)

- Find the NPA/NXX/SPN dialed(BARS) or
- Find the NPA/NXX/SPN/HNPA/HLOC/LOC/NSCL dialed (NARS)
- Identify the appropriate Route List index number.
- Check to see if Supplemental Digit Restriction/Recognition is in effect.

NCTL (87)

- Find the network access characteristics of the NCOS that applies to the call (RWTA, FRL, OHQ, CBQ and parameters).

RLB (86)

- Find the appropriate Route List.
- Analyze eligibility for each Route List entry (TOD, FRL, FCI, TGAR if applicable, tenant to route access, Class of Service).

- Find the FCAS table referenced on each Route List entry in the Route List.
- DGT (86)**
- Find the Digit Manipulation table referenced on each Route List entry in the Route List.

SIMPLIFIED CALL PROCESSING

Note: Unless otherwise specified, each step refers to what the network does.

DN TRANSLATOR

1. Checks to see if SPRE+6+Authcode is dialed.
 - a. If yes, proceeds to AUB Data Block.
 - b. If no, checks to see if number dialed is NARS access code (AC1) or (AC2).
 - 1) If yes, proceeds to ESN Data Block (Step 7).
 - 2) If no, call cannot access NARS.

AUB DATA BLOCK

2. Checks to see if length of Authcode entered is equal to ALEN.
 - a. If no, then, following interdigit timeout, line lockout treatment is provided.
 - b. If yes, proceeds to AUT Data Block.

AUT DATA BLOCK

3. Checks to see if Authcode entered is valid.
 - a. If no, the caller hears silence followed by overflow tone.
 - b. If yes, identifies Classcode number and proceeds to AUB Data Block.

AUB DATA BLOCK

4. Locates Classcode referenced in AUT Data Block.

5. Identifies Class of Service, TGAR, and NCOS of Authcode dialed and "remembers" them. Dial tone is provided.
6. Station user dials AC1 or AC2 and network proceeds to DN Translator (Step 1)

ESN DATA BLOCK

7. Checks DLTN to see if dial tone is to be provided after AC1 or AC2.
8. Station user completes dialing call.
9. Checks network time and date.

ESN DATA BLOCK

10. Compares time with TOD Schedules.
11. Identifies TOD Schedule number that applies.
12. "Remembers" TOD Schedule number.
13. Checks to see if Routing Control is in effect.
 - a. If no, accesses appropriate Translation Table (Step 19).
 - b. If yes, checks Station Data Block.

STATION DATA BLOCK

14. Identifies original NCOS of station.

ESN DATA BLOCK

15. Identifies alternate NCOS to replace original NCOS.
16. "Remembers" alternate NCOS.
17. Accesses appropriate Translation Table.

TRANSLATION TABLE DATA BLOCK

18. Locates digits dialed after access code.
 - a. If not found, call is sent to intercept as invalid NARS translation (NITR).

- b. If found, identifies Route List Index number.
- 19. "Remembers" RLI.
- 20. Checks to see if Supplemental Digit Restriction or Recognition applies.
 - a. If part or all of remaining digits dialed are denied, call is sent to intercept as a NARS restricted call (NRES).
 - b. If SDRR does not apply, call continues to Route List Data Block.

ROUTE LIST DATA BLOCK

- 21. Finds appropriate Route List.
Determines the Minimum FRL (if NAUT is equipped).
 - a. If NCOS's FRL is greater or equal to the MFRL, proceed to Step 23.
 - b. If NCOS's FRL is lower and Auth Code entered, go to Step 2.
- 22. Determines which entries are in the ISET.
- 23. Checks to see if first entry is idle.
 - a. If no, proceeds to next entry.
 - b. If yes, begins checking first entry eligibility.
- 24. Checks to see if TOD Schedule allows access.
 - a. If no, proceeds to next entry.
 - b. If yes, proceeds to Network Control Data Block.

NETWORK CONTROL DATA BLOCK

- 25. Identifies FRL of NCOS.
- 26. "Remembers" FRL.

ROUTE LIST DATA BLOCK

- 27. Compares Route List entry's FRL with NCOS' FRL.
 - a. If Route List entry is higher than NCOS' FRL, proceeds to next entry. $FRL-RLI > NCOS' FRL \Rightarrow NO ACCESS$
 - b. If FRL of Route List entry is equal to or less than NCOS' FRL, it continues checking eligibility. $FRL-RLI \leq NCOS' FRL \Rightarrow ACCESS$
- 28. Proceeds to FCI and checks for FCI other than 0.
 - a. If FCI is 0, proceeds to DMI.
 - b. If FCI is other than 0, proceeds to appropriate FCAS table.

USER (NCOS)
↑
NCTL

FCAS DATA BLOCK

- 29. Looks to see if NPA dialed is in FCAS table.
 - a. If no, returns to Route List entry 0 to process call.
 - b. If yes, checks to see if NXX dialed is allowed or denied.
 - 1) If denied, proceeds to next Route List entry.
 - 2) If allowed, returns to first Route List entry.

ROUTE LIST DATA BLOCK

- 30. Checks DMI for number other than 0.
 - a. If DMI 0, proceeds to Step 33.
 - b. If DMI other than 0, proceeds to appropriate Digit Manipulation table.

DIGIT MANIPULATION DATA BLOCK

- 31. Performs appropriate deletions and insertions.
- 32. Returns to Route List.

ROUTE LIST DATA BLOCK

- 33. Determines whether to provide Expensive Route Warning Tone (only if entry is in Extended Set).
- 34. Proceeds to Route Data Block.
- 35. Identifies trunk route type.
- 36. Proceeds to Station Data Block.

STATION DATA BLOCK

- 37. Identifies Class of Service of this station.
 - a. If COS denies call, proceeds to Route List next entry.
 - b. If COS allows call, returns to Route Data Block.

ROUTE DATA BLOCK

- 38. Identifies trunk route access code. *DE ESE MODO*
- 39. Outputpulses trunk route access code, thereby seizing trunk.
- 40. Outputpulses digits of call and call completes.
- 41. If first entry is not idle, checks everything as shown from step 23, only on next Route List entry.
(If all of ISET is busy.)

- 42. Determines which entries are eligible by checking TOD, FRL, FCI, and COS of station.
- 43. Goes to Network Control Data Block.

NETWORK CONTROL DATA BLOCK

- 44. Checks to see if OHQ is enabled for this customer.
 - a. If no, tests CBQ eligibility (Step 50).
 - b. If yes, continues to next step.
- 45. Checks NCOS to see if OHQ is allowed.
 - a. If no, tests CBQ eligibility (Step 50).
 - b. If yes, proceeds to Route List.

ROUTE LIST DATA BLOCK

- 46. Checks to see if at least 1 eligible entry in ISET allows OHQ.
 - a. If no, tests CBQ eligibility (Step 50).
 - b. If yes, checks OHQ availability.

ROUTE DATA BLOCK

- 47. Compares to OHQ thresholds the number of Priority Level 3 calls in queue for eligible Route List entries in ISET which allow OHQ.
 - a. If at least one Route List entry has threshold greater than or equal to count, call is placed in OHQ on all eligible Route List entries allowing OHQ.
 - b. If none, call tests CBQ eligibility (Step 50).

NETWORK CONTROL DATA BLOCK

- 48. If OHQ eligibility and availability pass, call is placed in OHQ for time specified in OHTL.
 - a. If no Route List entry becomes idle before OHTL expires, call is removed from OHQ and the system checks the Extended Set.

ROUTE LIST DATA BLOCK

- 49. Searches Extended Set for idle, eligible trunk.
 - a. If found, call completes (Step 38).
 - b. If not found, sends call to intercept as NARS/BARS blocked call (NBLK).

NOTE: CBQ is never offered to call after it is placed in OHQ.

NETWORK CONTROL DATA BLOCK

- 50. Checks to see if CBQ is enabled for this customer.
- 51. If not enabled, proceeds to Extended Set and searches for idle, eligible trunk.
 - a. If not found, sent to intercept as a NARS blocked call (NBLK).
 - b. If found, checks DMI (Step 30), EXP (Step 33) and call completes (Step 38).
- 52. If CBQ is enabled, checks NCOS to see if CBQ is allowed.
 - a. If not, call proceeds to Extended Set (Step 51).
 - b. If yes, proceeds to Route List.
- 53. Checks to see if at least one eligible entry in ISET allows CBQ.
 - a. If no, call proceeds to Extended Set (Step 51).
 - b. If yes, call passes CBQ eligibility and proceeds to Network Control.
- 54. Checks to see if NCOS is CBQ(I) or CBQ(A).
 - a. If CBQ(I), checks CBQ offer to see whether overflow tone or RAN is provided and proceeds to Station Data Block.
 - b. If CBQ(A), proceeds to Route List.

STATION DATA BLOCK

- 54a. Checks to see if station has Ring Again.
- 54a. If no, sends to intercept as NARS blocked call (NBLK).
- 54a2a. If yes, checks to see if Ring Again is active.

- 54a2a. If no, continues (Step 57).
- 54a2b. If yes, sent to intercept as NARS/BARS blocked call (NBLK).

ROUTE LIST DATA BLOCK

- 54bl. Searches Extended Set for idle, eligible trunk.
- 54bla. If not found, checks CBQ offer and proceeds to Station Data (Step 55a).
- 54blb. If found, checks DMI (step 30), EXP (Step 33), and call completes (Step 38).

STATION DATA BLOCK

- 55. CBQ is offered.
- 56. Station user either abandons call or activates Ring Again.
- 57. If station user activates Ring Again, call is placed in CBQ according to appropriate priority.

NETWORK CONTROL DATA BLOCK

- 58. Call continues through CBQ promotion schedule and route advance (SPRI, MPRI, PROM, RADT).

ROUTE LIST DATA BLOCK

- 59. Trunk becomes available before RADT expires.

ROUTE DATA BLOCK

- 60. Seizes trunk.

STATION DATA BLOCK

- 61. Notifies station user via Ring Again.
- 62. Network begins outpulsing at slow fixed rate.
- 63. Station user must respond within six seconds if a 500/2500 set.
- 64. Station user must respond within CBTL or total digit outpulse time if a multi-line set.
- 65. If station user does respond, outpulsing assumes normal rate and call completes.
- 66. If station user does not respond, call is abandoned after allowable time limit.

NOTE: ERWT is never offered to call after it has queued.

ROUTE LIST DATA BLOCK

- 67. No trunk becomes available before RADT expires.
- 68. Network searches Extended Set for an idle, eligible trunk.
 - a. If none are eligible, call remains in queue on ISET.
 - b. If idle, eligible trunk found, proceeds to Step 61.

CALL TRACING THROUGH THE MERIDIAN 1

LD 80 also provides a means of tracing a call by looking at a snap shot of the transient data associated with the call. The trace commands operate only when this overlay is active. If LD 80 is aborted (****) the trace functions stop. (see NOTE below)

X11 Release 19 and later include Enhanced Trace Commands. The enhanced trace function requires Multi-User functionality (package 242) to be enabled in LD 17. Enhanced Trace provides a means of tracing a Terminal Number for a specific period of time, generating a new record any time the status of the TN changes (idle, ringing, dialing, etc.) during the specified time frame.

NOTE: When using Enhanced Trace commands, the overlay will not automatically abort (according to the defined time-out period) if calls are being traced.

When a system initialization occurs, all trace commands are removed and the trace operation is stopped.

NETWORK CALL TRACE

Network Call Trace is available on switches with Release 17 and later equipped with ISDN/PRI software. A network call is traced by dialing the network call trace code before the actual network number.

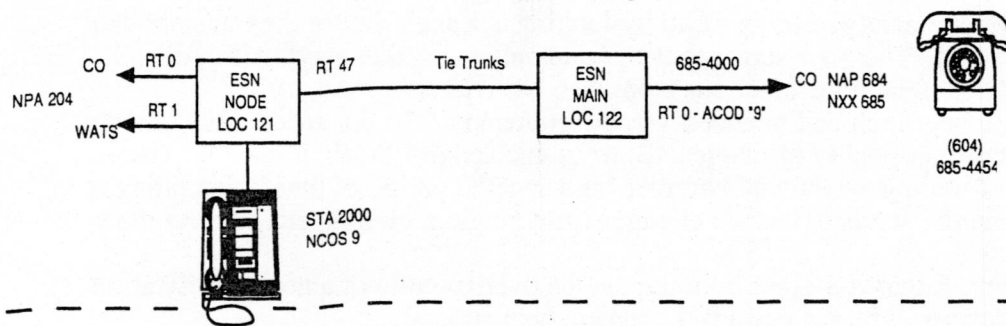
A call can be traced by any telephone with a CLTA class of service. To trace a call, dial the following:

SPRE + 9912 + XX + network number.

XX = Trace function, either 01 or 02

Dial tone will be heard after the 01 or 02 is dialed.

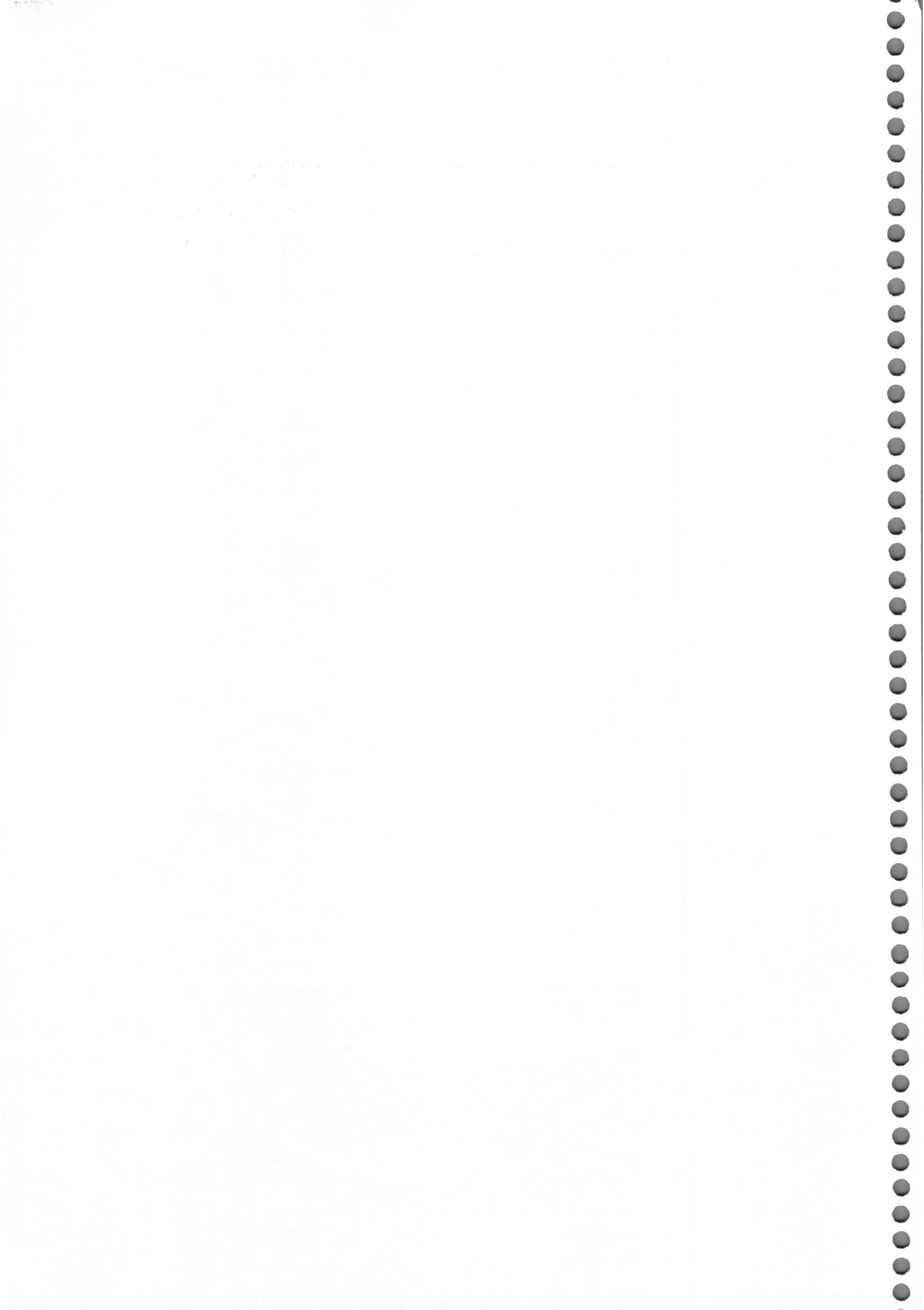
ESN Call Routing



STA #2000 DIALS	ESN DATA BLOCK	*NET* TRANSLATION - AC1	ROUTE LIST INDEX 10
8-664-685-4454 at 2:30 PM	- AC1 8 - TODS 0 00 00 07 59 TODS 1 08 00 09 14 TODS 2 09 15 10 44 TODS 3 10 45 13 29 TODS 4 13 30 15 59 TODS 5 16 00 16 59 TODS 6 17 00 23 59 NCOS 9 FRL 2 RWTA NO OHQ NO CBQ YES ROUT 1 RADT 0 SPRI 0 MPRI 1 PROM 20	NPA 604 RLJ 10 SDR = 1 DENY 6854000 DMI 1 DEL 3 INST 9	ENTR 0 RT 47 TOD ALL ON CNV NO EXP NO FRL 1 DMI 1 FCI 2 OHQ YES CBQ YES ENTR 1 RT 1 TOD 4 OFF CNV NO EXP YES FRL 5 DMI 2 FCI 0 OHQ NO CBQ YES FCI 2 NPA 604 NXX DENY DENY 739 743 779 ISET 1 MFRL 1 Call Completion or Queuing or Standard Blocking

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MODULE 28

**DESCRIBING
COORDINATED
DIALING PLAN**

MODULE 28

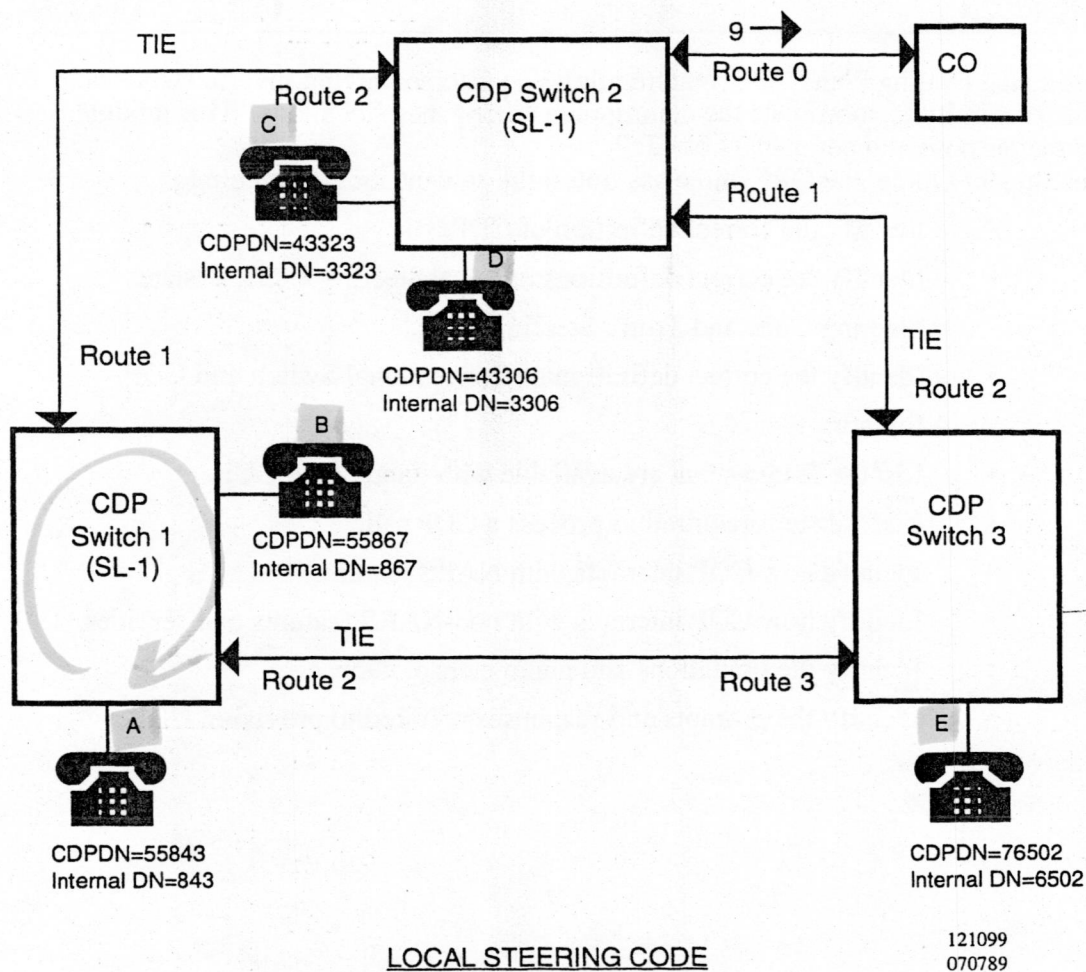
OBJECTIVES

The Coordinated Dialing Plan (CDP) feature allows a customer having several switches in geographic proximity to coordinate the dialing plan among these locations. This module describes the purpose and parameters of CDP.

Given the Student Guide, the QRC and class notes, the student should be able to:

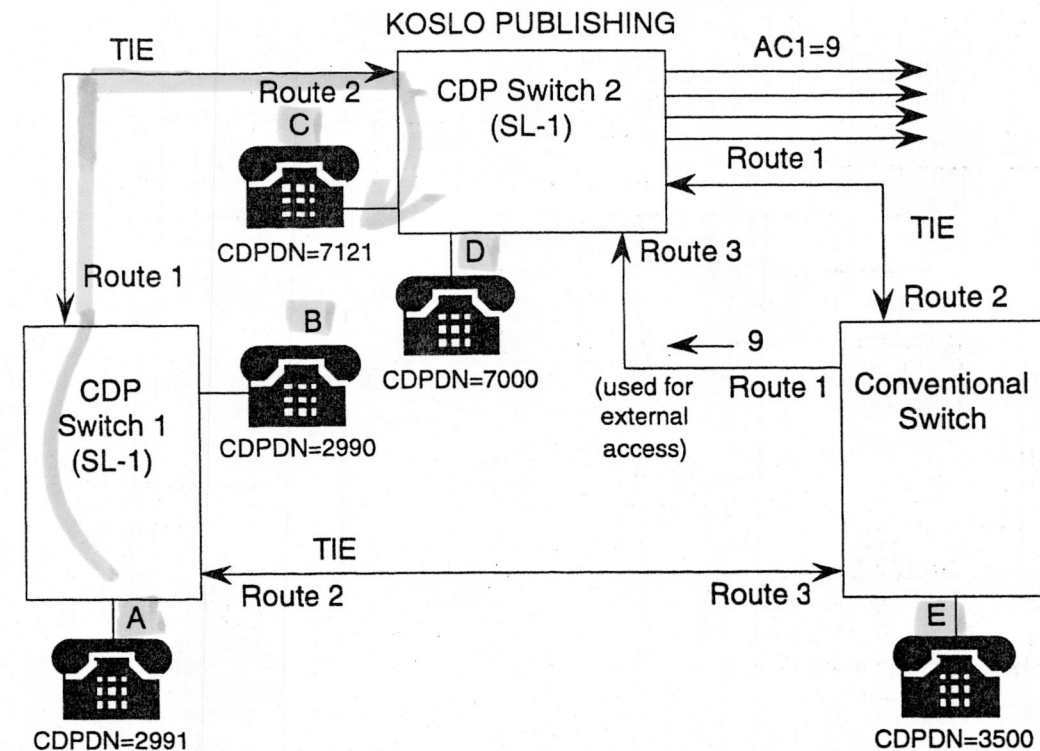
- Identify the correct definition of CDP.
- Identify the correct definitions of Local Steering Code, Distant Steering Code and Trunk Steering Code.
- Identify the correct definition of Conventional Switch and CDP Switch.
- List the features that are available with stand-alone CDP.
- List the steps required to process a CDP call.
- Identify how CDP interacts with NARS features.
- Identify how CDP interacts with non-NARS features and services.
- Identify the limitations and parameters of CDP.
- Identify the prompts and responses required to provision CDP.

KOSLOWSKI, KOSLOWSKI, KOSLOWSKI, AND KOSLOWSKI,
ATTORNEYS AT LAW



- Station user A at CDP switch #1 dials 55843.
- 55 is defined in translation as a local steering code.
- Database indicates that two leading digits are to be deleted.
- System deletes 55 and dials 843, an internal DN.

Figure 1



CDP SWITCH #1	
LD 87	LD 86
FEAT CDP	FEAT RLB
TYPE DSC	RLI 2
DSC 3	ENTR 0
RLI 10	ROUT 1
TYPE DSC	RLI 10
DSC 7	ENTR 0
RLI 2	ROUT 2

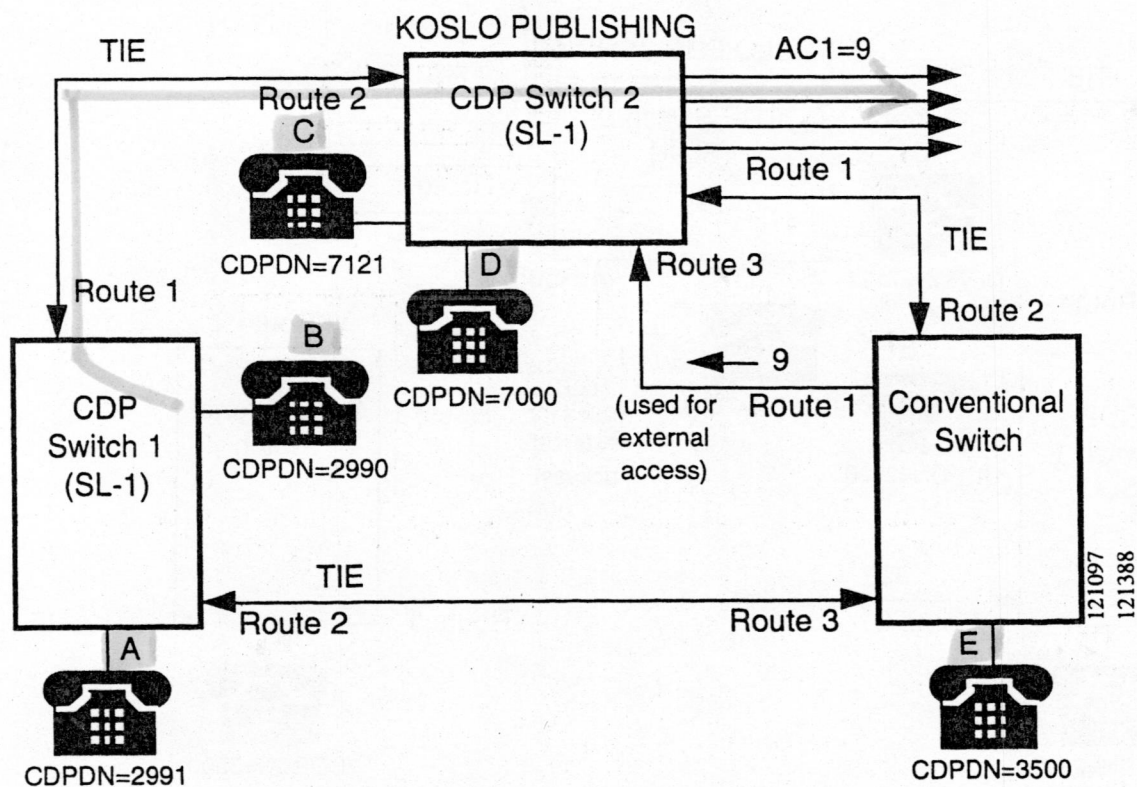
DISTANT STEERING CODE

CDP SWITCH #2	
LD 87	LD 86
FEAT CDP	FEAT RLB
TYPE DSC	RLI 1
DSC 2	ENTR 0
RLI 5	ROUT 1
TYPE DSC	RLI 5
DSC 3	ENTR 0
RLI 1	ROUT 2

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Station user A at CDP switch 1 dials 7121. 7 is defined as a distant steering code which uses Route List 2. An available trunk in entry 0 is seized and the digits 7121 are outputted to CDP switch 2. The system dials 7121, an internal DN.

Figure 2



TRUNK STEERING CODE

CDP SWITCH #1

LD 87

FEAT CDP
TYPE TSC
TSC 9
RLI 2

LD 86

FEAT RLB
RLI 2
ENTR 0
ROUT 1

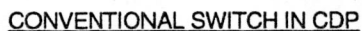
CDP SWITCH #2

LD 86

FEAT ESN
AC1 9

Station user B at CDP switch 1 dials 9-1214-272-3941. 9 is defined in translation as a trunk steering code referencing Route List 2. An available trunk in entry 0 is seized and the digits 9-1214-272-3941 are outpulsed. CDP switch 2 finds that 9 is defined as the access code for BARS. The remaining digits are processed through BARS.

Figure 3



- Station user E dials 2990. 2 is the access code to Route 3 (TIE). The digits 990 are outputted to CDP switch 1, where incoming tie Rout 2 is defined to insert a 2. The call is processed to internal extension 2990.
- Station user B dials 3500. 3 is defined in translation as a distant steering code referencing Route List 10. The digits 3500 are outputted to the conventional switch, where they are recognized as an internal DN.
- Station user E dials 9-1214-272-3941. 9 is the access code to Route 1 (TIE). The digits 1214-272-3941 are outputted to CDP switch 2, where the leading digit 9 is inserted. 9 is the access code to BARS. The system processes the remaining digits through BARS.

Figure 4

DEFINITION

The Coordinated Dialing Plan (CDP) feature allows a customer having several PBXs coordinate the dialing plan among these locations. The CDP feature enables a call originator to directly call any other station within the CDP group of switches by dialing that station's CDP-DN, a unique three- to seven-digit (or three- to ten-digit, Rls. 13+) number assigned to the station. The CDP feature may be arranged to provide centralized access to the public network through a single Meridian 1 switch within the CDP group. The CDP feature may also be used to share Direct Inward Dialing (DID) numbers among the CDP group rather than renting separate banks of numbers for each location.

PARAMETERS

CDP software may be used in conjunction with NARS software or in a stand-alone CDP application.

Stand-alone CDP supports the following features:

- Digit Manipulation.
- Time-of-Day Schedules.
- Facility Restriction Level.
- Network Class-of-Service.
- Route List Indices

CDP supports the following additional features when used in conjunction with NARS (and appropriate packages are equipped):

- Expensive Route Warning Tone
- Call Back Queuing
- Off-Hook Queuing
- Authorization Code Last

KOSLO PUBLISHING

Meridian SL-1 PBX CDP Switch 1	Meridian SL-1 PBX Conventional Switch	Meridian SL-1 PBX CDP Switch 2
0-Attendant 1-SPRE 2 XXX DNs 3 4X Trunk Access 5 6 7 8 9	0-Attendant 1-SPRE 2 3XXX DNs 4 5 6 7 8 9	0-Attendant 1-SPRE 2 3 4 5 6XXX DNs 7XXX DNs 8X Trunk Access 9-AC1 for BARS

275036
092289

Steering codes are part of the customer's numbering plan, and their assignment impacts the customer's numbering plan to the same extent as the assignment of DNs, SPRE code, attendant DN, route access codes, and NARS/BARS access codes.

The customer at CDP Switch 1 may assign steering codes from the following areas of the numbering plan: 3XXX, 5XXX, 6XXX, 7XXX, 8XXX, 9XXX. The customer at CDP Switch 2 may assign steering codes from the following areas of the numbering plan: 2XXX, 3XXX, 4XXX, 5XXX.

Figure 1

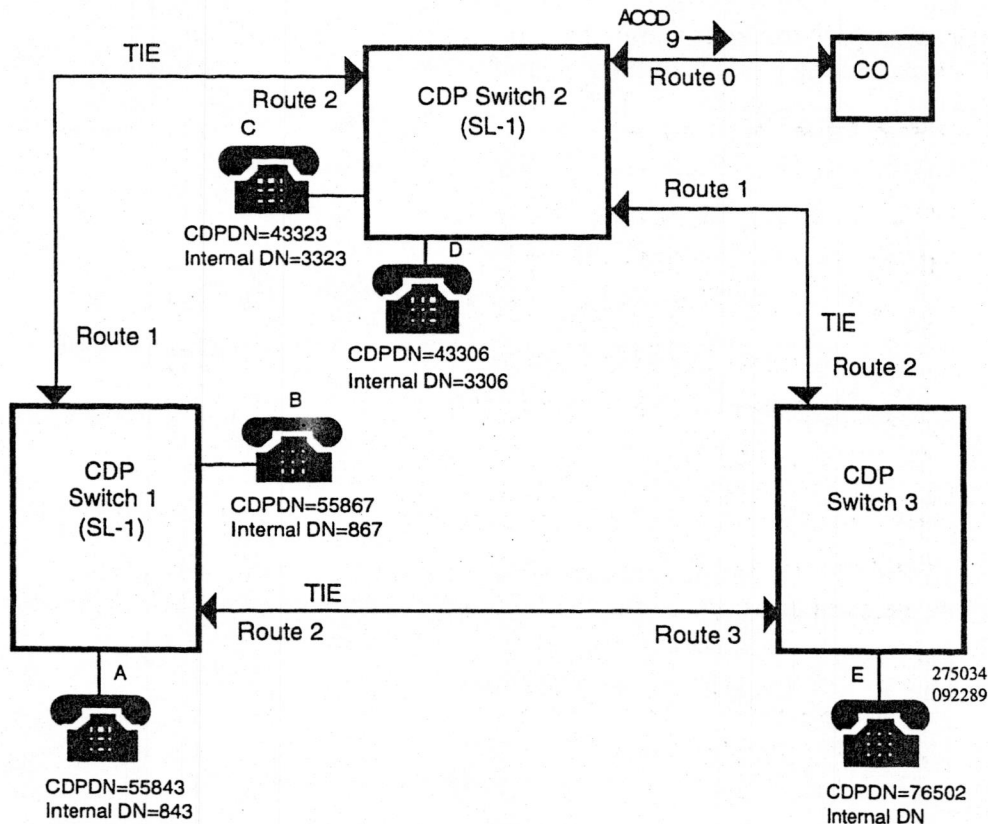
STEERING CODE DEFINITION

A CDP Steering Code is a unique number dialed by a call originator along with the internal DN which the CDP software translates to determine where a call is to be routed within a CDP group.

A CDP Directory Number (CDP-DN) consists of an internal DN prefixed with the appropriate steering code.

STEERING CODE PARAMETERS

- One to four digits in length (Rls. 1 - 12).
- One to seven digits in length (Rls. 13+).
- At each switch in a CDP group, the Steering Code must be distinct (left-wise unique) from any assigned access codes (figure 1).
- The CDP feature supports up to 5000 (Rls. 1 - 12) or 10000 (Rls. 13+) Steering Codes.
- The Steering Code is outpulsed along with other dialed digits on an outgoing trunk.
- There are three types of steering codes:
 - Local Steering Code (LSC)
 - Distant Steering Code (DSC)
 - Trunk Steering Code (TSC)

KOSLOWSKI, KOSLOWSKI, KOSLOWSKI, AND KOSLOWSKI, ATTORNEYS AT
LAWLOCAL STEERING CODE

LOCAL STEERING CODE = 55
DELETE 2 DIGITS

- Station user A at CDP switch #1 dials 55867.
- 55 is defined in translation as a local steering code.
- Database indicates that two leading digits are to be deleted.
- System deletes 55 and dials 867, an internal DN.

Figure 2

LOCAL STEERING CODE DEFINITION

A local Steering Code (LSC) identifies the PBX that is performing the call routing and provides local (internal) station translation only.

The function of a Local Steering Code is to provide uniformity in a CDP environment supporting variable length dialing plans.

LOCAL STEERING CODE PARAMETERS

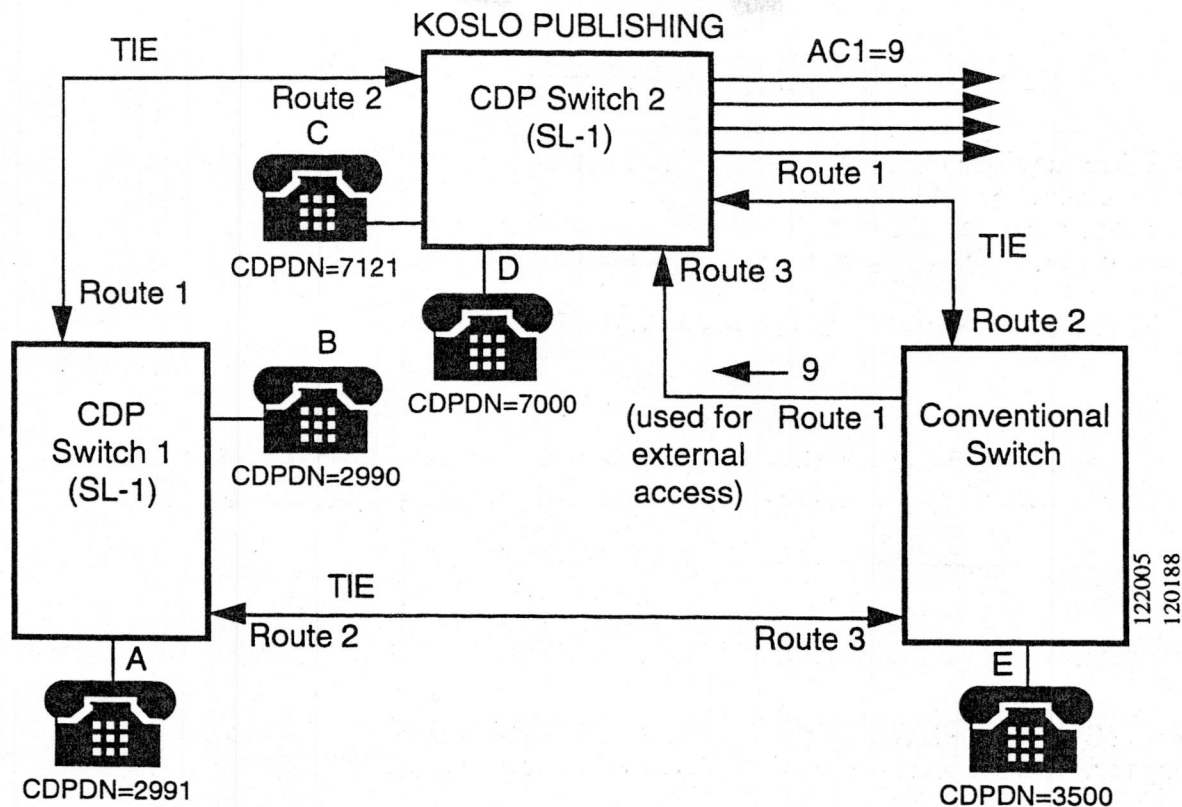
- The LSC **may** be deleted by the CDP software.
- A CDP switch may have more than one Local Steering Code assigned.
- If the internal DNs are unique and of the same length at each location, local steering codes are not necessary.

DISTANT STEERING CODE DEFINITION

A Distant Steering Code (DSC) identifies another PBX in the CDP group and provides call routing to a station at a distant location. A Route List is associated with each DSC.

DISTANT STEERING CODE PARAMETERS

- The Distant Steering Code, along with the other dialed digits, is outpulsed on the outgoing trunk.
- Automatic Least Cost Routing characteristics may be applied e.g., Digit Manipulation, Time-of-Day Schedules, and NCOS (with FRL).



DISTANT STEERING CODE

CDP SWITCH #1

DISTANT STEERING CODE = 3
USE ROUTE LIST 10

DISTANT STEERING CODE = 7
USE ROUTE LIST 2

ROUTE LIST 2
ENTRY 0
ROUTE 1 (TIE)

ROUTE LIST 10
ENTRY 0
ROUTE 2 (TIE)

CDP SWITCH #2

DISTANT STEERING CODE = 2
USE ROUTE LIST 5

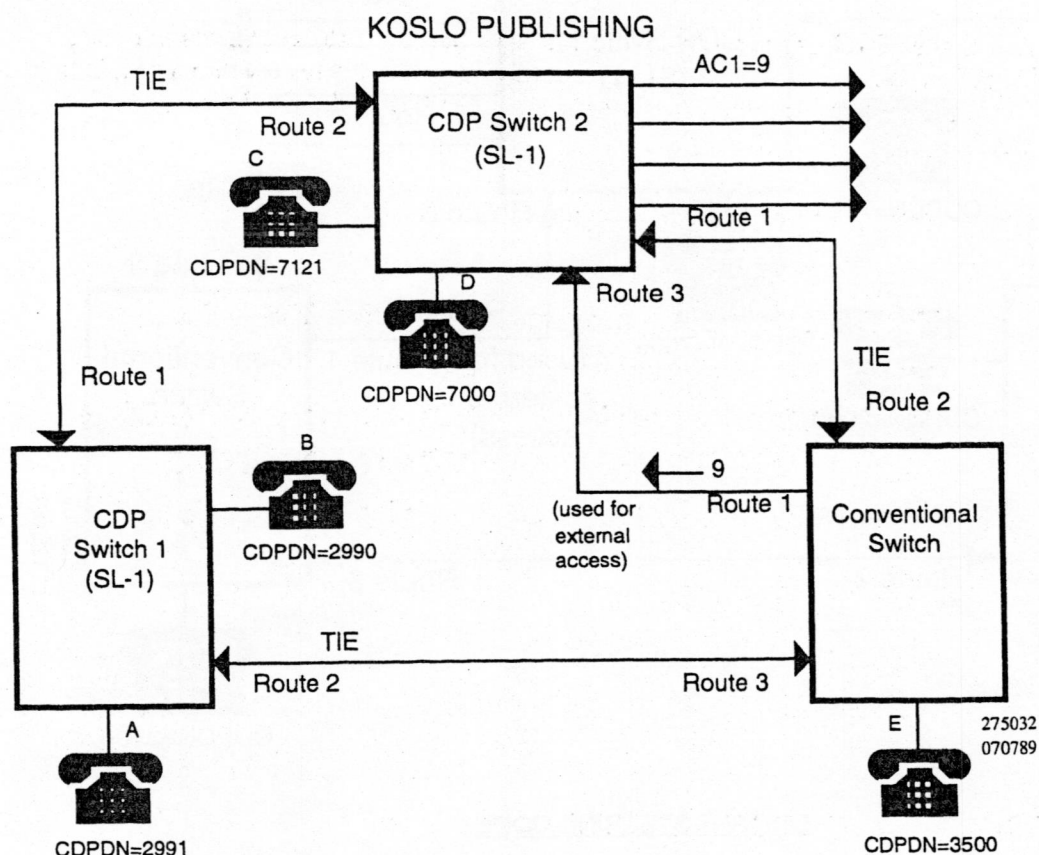
DISTANT STEERING CODE = 3
USE ROUTE LIST 1

ROUTE LIST 1
ENTRY 0
ROUTE 1 (TIE)

ROUTE LIST 5
ENTRY 0
ROUTE 2 (TIE)

Station user A at CDP switch 1 dials 7121. 7 is defined as a distant steering code which uses Route List 2. An available trunk in entry 0 is seized and the digits 7121 are outputted to CDP switch 2. The system dials 7121, an internal DN.

Figure 3



TRUNK STEERING CODE

CDP SWITCH #1

TRUNK STEERING CODE = 9
USE ROUTE LIST 2

ROUTE LIST 2
ENTRY 0
ROUTE 1 (TIE)

CDP SWITCH #2

BARS ACCESS CODE = 9

Station user B at CDP switch 1 dials 9-1214-272-3941. 9 is defined in translation as a trunk steering code referencing Route List 2. An available trunk in entry 0 is seized and the digits 9-1214-272-3941 are outpulsed. CDP switch 2 finds that 9 is defined as the access code for the BARS. An available trunk is seized and the remaining digits are outpulsed.

Figure 4

TRUNK STEERING CODE DEFINITION

A Trunk Steering Code (TSC) is used to provide centralized access to the public exchange network and identifies route access codes at another PBX. A TSC is used when a call is to be routed to the exchange network via a facility at a distant PBX in the CDP group. A Route List is associated with each TSC.

TRUNK STEERING CODE PARAMETERS

- The Trunk Steering Code, along with the other dialed digits, is outpulsed on an outgoing trunk.
- The Trunk Steering Code is typically the route access code (ACOD) or NARS/BARS access codes (AC-1/AC-2) at the distant PBX.
- Automatic Least Cost Routing characteristics may be applied e.g.,
Digit Manipulation,
Time-of-Day Schedules, and
NCOS/FRL

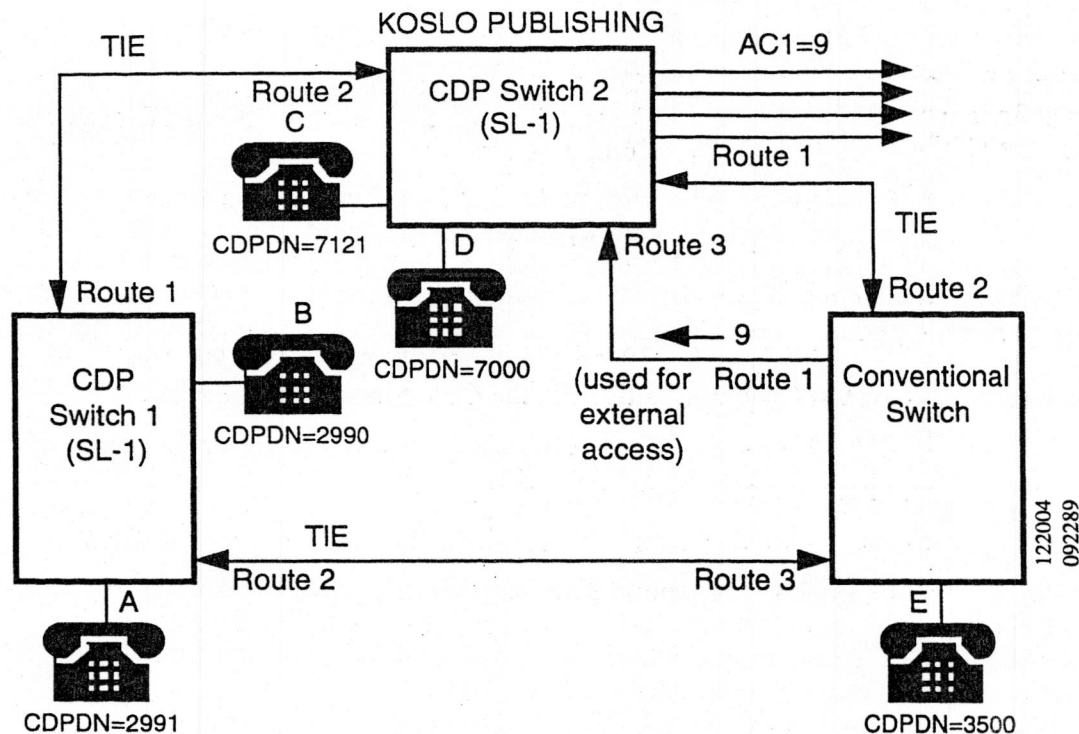
CONVENTIONAL SWITCH DEFINITION

A Conventional Switch is a Meridian 1 or any other switch that is **not** equipped with CDP software.

CONVENTIONAL SWITCH ACCESS

A Conventional Switch may be an integrated part of a CDP group. Calls to the Conventional Switch are made by dialing a Distant Steering Code plus the internal directory number, i.e., the CDP-DN. The CDP switch may be arranged to:

- Allow the DSC to be outpulsed if all the station numbers at the conventional Switch begin with the same digit (i.e., DSC used is the first digit of the DN).
- Allow the DSC to be outpulsed if all the station numbers at the Conventional Switch are prefixed with the same DSC number.
- Delete the DSC with Digit Manipulation if the Conventional Switch will not recognize the Steering Code.
- Delete the DSC with Digit Manipulation if the Conventional Switch cannot absorb the Steering Code.



CONVENTIONAL SWITCH IN CDP

CDP SWITCH #1

DISTANT STEERING CODE = 3
USE ROUTE LIST 10

ROUTE LIST 10
ENTRY 0
ROUTE 2 (TIE)

ROUTE 2
INSERT THE DIGIT 2.
DO NOT PROVIDE DIAL TONE TO
INCOMING CALLERS.

CONVENTIONAL SWITCH

ROUTE 3 (TIE)
ACCESS CODE = 2

ROUTE 1 (TIE)
ACCESS CODE = 9

ROUTE 2 (TIE)
ACCESS CODE = 7

CDP SWITCH #2

DISTANT STEERING CODE = 3
USE ROUTE LIST 1

ROUTE LIST 1
ENTRY 0
ROUTE 1 (TIE)

ROUTE 1
INSERT THE DIGIT 7. DO NOT
PROVIDE DIAL TONE TO
INCOMING CALLERS.

ROUTE 3
INSERT THE DIGIT 9.
PROVIDE DIAL TONE TO
INCOMING CALLERS.

BARS ACCESS CODE = 9

- Station user E dials 2990. 2 is the access code to Route 3 (TIE). The digits 990 are outputted to CDP switch 1, where a leading digit is inserted. The digits 2990 are recognized as an internal DN.
- Station user B dials 3500. 3 is defined in translation as a distant steering code referencing Route List 10. The digits 3500 are outputted to the conventional switch, where they are recognized as an internal DN.
- Station user E dials 9-1214-272-3941. 9 is the access code to Route 1 (TIE). The digits 1214-272-3941 are outputted to CDP switch 2, where the leading digit 9 is inserted. 9 is the access code to BARS. The system processes the remaining digits through BARS.

Figure 5

Calls to a CDP switch from a Conventional Switch are made by dialing a CDP-DN: a Steering Code (which is actually the access code of the tie route to the CDP switch) plus the internal DN. The Conventional Switch will absorb the access code and outpulse the remaining digits dialed. The CDP switch may then re-insert the DSC on the incoming side if the number is needed as part of an internal DN.

A CDP switch may be arranged to provide centralized access to the public network for users at the Conventional Switch. To access this feature, a separate tie trunk route must be installed from the Conventional Switch to the CDP switch providing access. The access code of this tie route is typically identical to the public network access code at the serving CDP switch. Once dialed, the Conventional Switch will absorb the access code. The CDP switch will be arranged to insert incoming calls from the Conventional Switch (dialing transparency).

CDP CALL ROUTING

Up to 32 (Rls. 1 - 12) or 128 (Rls. 13+) Route Lists may be defined for the routing of calls from a CDP-equipped Meridian 1 switch. Each Route List may contain up to three (Rls. 1 - 12) or seven (Rls. 13+) alternate routes. The number of Route Lists available for CDP use, is increased to 256 if the Meridian 1 is equipped with NARS.

CDP DIGIT MANIPULATION

Route list entries may be associated with Digit Manipulation tables. There may be 32 (# 0-31) Digit Manipulation tables defined at a CDP switch. The number of Digit Manipulation tables available for CDP use, is increased to 256 (# 0-255) if the Meridian 1 is equipped with NARS. Digit Manipulation Table 0 is used to indicate that no Digit Manipulation is required. Each Digit Manipulation table may be defined to delete up to 15 leading digits and to insert up to 24 leading digits of a dialed CDP number.

CDP TIME-OF-DAY SCHEDULES

Two (# 0-1) Time-of-Day Schedules may be defined at a CDP switch. If the Meridian 1 Switch is equipped with NARS, eight (# 0 - 7) Time-of-Day Schedules may be defined. When a Route List entry is selected for a CDP call, the CDP software compares the current time-of-day with the Time-of-Day schedule(s) referenced by the entry. If the entry is "turned off" according to the schedule, it is not available for the call.

QUEUEING

Queueing against local (internal) stations is provided by the standard M-1 Ring Again (RGA) feature. For calls directed to a distant CDP switch, Ring Again may be applied if all local outgoing trunk facilities to the distant switch are busy. Ring Again cannot be applied against busy stations at a distant CDP switch. Busy tone is not provided until the full CDP number is dialed.

FEATURE INTERACTIONS

The CDP Feature may be implemented at a switch equipped with the NARS software package. If such is the case, the following considerations apply:

- Steering codes for CDP calls must be distinct from the assigned NARS Access Codes.
- CDP numbers may be integrated with the NARS Uniform Dialing Plan (UDP). A five-digit CDP number may be the same as the last five digits of a seven-digit UDP number.
- NARS Route Lists, Digit Manipulation tables, and Time-of-Day Schedules may be **shared** by CDP calls.
- Ring Again may be applied to busy trunks at a distant CDP switch only if CCBQ and/or CBQCM are equipped.
- Users eligible for the OHQ and CBQ features may use them when placing CDP calls.
- FCAS does not apply to CDP calls.
- Routing Control may be applied to CDP users.

NCOS. Included as part of each NCOS group is a Facility Restriction Level (FRL) number. The FRL is used by CDP software to determine the entries in a Route List to which a station user has access when placing a CDP call. A CDP equipped switch accommodates four NCOS groups (#0 - 3).

ATTENDANT FEATURES. A user at a local CDP switch calls the local attendant, the user's internal DN (not the full CDP DN) is displayed. A user at a CDP switch calls an attendant at another CDP switch, the trunk access code and member number of the incoming trunk are displayed.

COS/TGAR. For CDP calls, all Class of Service treatment remains the same with the exception of CTD and CUN, which are treated as UNR. Users with FR2 class of service may make local CDP calls, but cannot make CDP calls to distant switches. Trunk Group Access Restrictions (TGAR) may be ignored or acknowledged for the purpose of routing CDP calls.

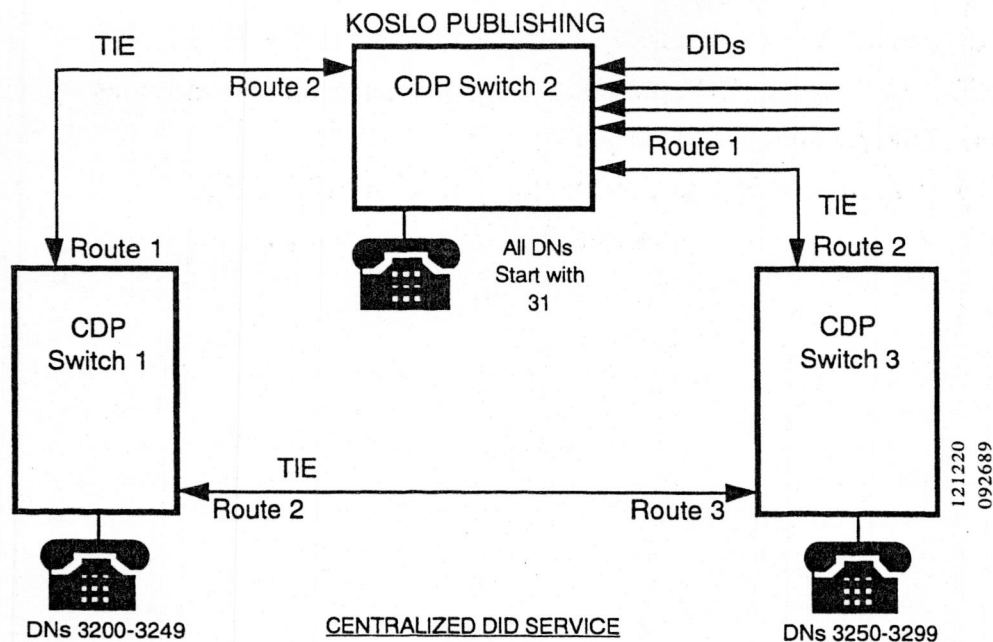
Call Detail Recording. Call originators are identified by their internal DNs, not the complete CDP DN. As of Rls. 9, CDR records may be optionally defined to record DSC/TSC+DN or ACOD+DN (specified on a per-customer basis). Outpulsed digits option available for NARS with Rls. 12+ does not apply to CDP calls.

Direct Inward Dialing. Because a CDP DN may be up to ten digits in length, the capability of inserting leading digits on DID trunks is provided. DID service may also be centralized, i.e., installed at only one CDP switch in the group. The CDP software may then be arranged to use Distant Steering Codes to partition the bank of DID numbers among the CDP group. This may be a cost-effective way alternative to customer and their callers (especially if reaching other PBXs in the group would be a toll charge and the switch where the DIDs are installed is not - see Figure 6.

Hunting. Hunting across different switches in a CDP group is not supported. Standard Meridian 1 hunting may be applied to local CDP calls.

Meridian 1 Digit Display.

- Outgoing CDP call - The complete CDP DN is displayed at the originating set.
- Incoming CDP call - The trunk access code and member number of the incoming trunk route are displayed at the terminating set.
- Internal CDP call - At the originating set, the complete dialed CDP DN is displayed. At the terminating set, the internal DN of the originating set is displayed.



CENTRALIZED DID SERVICE

CDP SWITCH #1

DISTANT STEERING CODE = 31
USE ROUTE LIST 10

DISTANT STEERING CODE = 325
USE ROUTE LIST 2

DISTANT STEERING CODE = 326
USE ROUTE LIST 2

DISTANT STEERING CODE = 327
USE ROUTE LIST 2

DISTANT STEERING CODE = 328
USE ROUTE LIST 2

DISTANT STEERING CODE = 329
USE ROUTE LIST 2

ROUTE LIST 2
ENTRY 0
ROUTE 2

ROUTE LIST 10
ENTRY 0
ROUTE 1

CDP SWITCH #2

DISTANT STEERING CODE = 320
USE ROUTE LIST 5

DISTANT STEERING CODE = 321
USE ROUTE LIST 5

DISTANT STEERING CODE = 322
USE ROUTE LIST 5

DISTANT STEERING CODE = 323
USE ROUTE LIST 5

DISTANT STEERING CODE = 324
USE ROUTE LIST 5

DISTANT STEERING CODE = 325
USE ROUTE LIST 1

DISTANT STEERING CODE = 326
USE ROUTE LIST 1

DISTANT STEERING CODE = 327
USE ROUTE LIST 1

DISTANT STEERING CODE = 328
USE ROUTE LIST 1

DISTANT STEERING CODE = 329
USE ROUTE LIST 1

ROUTE LIST 1
ENTRY 0
ROUTE 1

ROUTE LIST 5
ENTRY 0
ROUTE 2

CDP SWITCH #3

DISTANT STEERING CODE = 31
USE ROUTE LIST 5

DISTANT STEERING CODE = 320
USE ROUTE LIST 6

DISTANT STEERING CODE = 321
USE ROUTE LIST 6

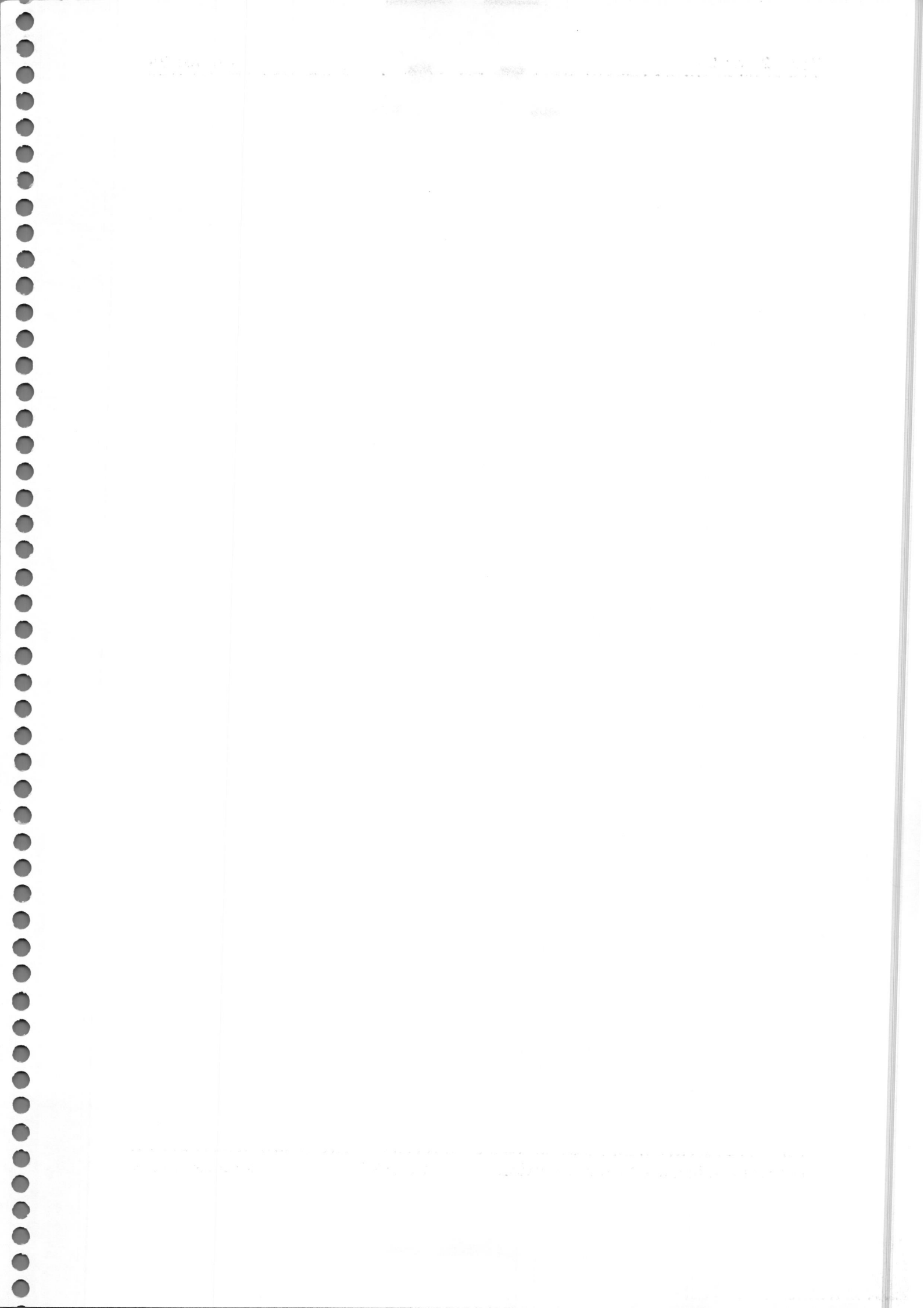
DISTANT STEERING CODE = 322
USE ROUTE LIST 6

DISTANT STEERING CODE = 323
USE ROUTE LIST 6

DISTANT STEERING CODE = 324
USE ROUTE LIST 6

ROUTE LIST 5
ENTRY 0
ROUTE 2

ROUTE LIST 6
ENTRY 0
ROUTE 3





MODULE 29

**DESCRIBING NETWORK
TRAFFIC MEASUREMENTS**

MODULE 29

OBJECTIVES

The Network Traffic feature provides traffic measurement data related to network performance and network traffic. This module describes the purpose and parameters of Network Traffic.

Given the Student Guide, the QRC and class notes, the student should be able to:

- Identify the correct definition of Network Traffic.
- Identify the feature package required to collect Network Traffic.
- List the Network Traffic reports and their functions.
- Identify the prompts and responses required to provision Network Traffic.

DEFINITION

The Network Traffic feature (NTRF) provides traffic measurement data related to network performance and network traffic. The NTRF feature may be equipped at M-1 ESN Nodes and M-1 ESN Mains. Effective use of this data enables the network communications manager to assess the effectiveness of the network, and to identify specific areas of network operation where improvements are warranted.

The network traffic measurements accumulated at an M-1 switch equipped with the NARS (M-1 ESN Node), BARS (M-1 ESN Main), or CDP features encompass the following areas of operation (in addition to regular M-1 traffic measurement):

- Network Class of Service (NCOS)
- Routing
- Off-hook Queuing (OHQ)
- Call Back Queuing (CBQ)
- Coordinated Call Back Queuing (CCBQ)
- Call Back Queuing to Conventional Main (CBQCM)
- Incoming trunk Groups

PARAMETERS

- The Network Traffic package (NTRF, package 29) must be equipped at each M-1 site.
- The NTRF package provides the following four traffic reports:
 - Routing Traffic Measurements (TFN001)
 - NCOS Measurements (TFN002)
 - Incoming Trunk Group Measurements (TFN003)
 - OHQ Threshold Violation Measurements (TFN101)

ROUTING TRAFFIC MEASUREMENT (TFN001) DEFINITION

The routing traffic measurements (TFN001) provide data related to route list utilization. The measurements show how often a route list was accessed, which entries in the list were used, and some statistics reflecting the use of Call-Back Queuing and Off-Hook Queuing. Routing traffic measurements are available at an M-1 ESN Node (NARS) and M-1 ESN Main (BARS) switches.

TFN001 ROUTING TRAFFIC FORMAT

The routing traffic measurements contain the following statistics for each define route list: (System ID) = unique three-digit number that identifies the switch from which this report was generated.

TFN001 = report number.

(Customer ID) = The customer for whom this report was generated.

RLST XXX = Route list index number.

A TFN001 is generated for every Route list programmed.

a = **Route List Requests.** This measurement identifies the total number of call attempts for which the called destination translations identified this route list to attempt call completion.

b = **Route List Requests served Without Delay.** This measurement reflects the total number of network calls which were routed without encountering blocking or queuing.

c = **Expensive Route Acceptances.** This measurement identifies the number of calls which were allowed to complete over an expensive trunk route after Expensive Route Warning Tone (ERWT) was provided.

d = **Route List Requests Standard Blocking.** This measurement identifies the number of call attempts which could not be served because a route or queuing process was not available to a user. The blocked call may have been routed to overflow tone, a recorded announcement, or the attendant.

e = Not defined. (all zeros)

f = Not defined. (all zeros)

g = **Route List Entry Usage Count.** This measurement identifies the number of calls which were routed successfully over a particular route (entry) in a route list. A count is maintained for each route list entry.

OHQ MEASUREMENTS

h = Quantity of Calls Placed in OHQ. This measurement identifies the number of calls which attempted to use a route in the route list but, because facilities were not immediately available, the call was permitted to remain off-hook to wait for facilities.

i = Average Time in OHQ. This measurement identifies the average duration that calls remained in the OHQ until a route became available. The value (expressed in units of 0.1 s.) represents the average time in the queue. Calls which timed out in the queue before a route was selected are also included in the average.

j = Quantity of Calls Abandoned from OHQ. This measurement identifies the number of calls which were placed in the OHQ but were abandoned (i.e., the caller went on-hook before a route became available or the time limit was reached).

k = Quantity of CBQ Calls. This measurement identifies the number of calls which were offered CBQ and accepted the offer.

l = Average Time in CBQ. This measurement identifies the average duration (in units of 0.1 s.) calls remained in the CBQ. Calls which were cancelled and calls which were served are included in this measurement.

m = Quantity of CBQ Offerings. This measurement is a count of the number of calls which were offered CBQ, regardless of whether the offer was accepted or not.

n = Quantity of CBQ User Cancellations. This measurement identifies the number of calls which were removed from the CBQ on the call originator's request (i.e., cancellation of the Ring Again feature).

p = Not defined. (all zeros)

TFN001 ROUTING FORMAT

(system ID)	TFN001						
(cust. number)							
RLST	XXX	aaaaa	bbbbb	ccccc	ddddd	-----	
	RT	ggggg	ggggg	ggggg	ggggg	ggggg	ggggg
		ppppp	ppppp	ppppp	ppppp	ppppp	ppppp
	OHQ	hhhhh	iiii	jjjj			
	CBQ	kkkkk	llll	mmmmm	nnnnn		

FIELD DESCRIPTIONS

a = route list requests (pegs each time RLI selected)
 b = RLI requests served w/o delay (no blocking/queueing)
 c = expensive route acceptances (if received ERWT)
 d = RLI requests blocked (none idle/elig. and failed queueing)
 g = entry usage peg count (pegs if entry seized)
 h = number of calls placed in OHQ
 i = avg. time per call in OHQ (total OHQ time/# calls OHQ)
 j = # calls abandoned from OHQ (hung up before route became available or before OHTL)
 k = # CBQ offers accepted
 l = avg. time per call in CBQ (total CBQ time/# calls CBQ)
 m = # CBQ offers
 n = # CBQ user cancellations
 p = not defined (all zeros)
 XXX = Route List number

Figure 1

NCOS MEASUREMENTS (TFN002) DEFINITION

Traffic measurements are collected for each defined NCOS group (0-99 NARS, BARS) to indicate the grade of service, in terms of blocking and queuing delay, being provided by the system. If a grade of service is determined by the communications manager to be inappropriate for users in a particular NCOS group, the communications manager may either reassign the users to another NCOS group, redefine the characteristics of the existing NCOS group, or change the routing parameters. NCOS measurements are available at M-1 ESN Node (NARS) and M-1 ESN Main (BARS) switches.

TFN002 NCOS MEASUREMENT FORMAT

The NCOS traffic measurements contain the following statistics for each defined NCOS group:

(System ID) = unique three-digit number that identifies the switch from which this report was generated.

TFN002 = report number.

(Customer number) = The customer for whom this report was generated.

NCOS XXX = NCOS group number. A TFN002 is generated for every NCOS group programmed.

a = Quantity of Calls Attempted. This measurement identifies the total number of call attempts generated by users in this NCOS group.

b = Routing Requests Served Without Delay. This measurement identifies the number of call attempts which were routed without encountering blocking or queuing.

c = Expensive Route Acceptance. This is a count of the number of callers to whom Expensive Route Warning Tone was provided, and who accepted an expensive route to complete a call.

d = Network Call Standard Blocking. This measurement identifies the number of call attempts which could not be completed because a route or queuing process was not available to a user. The blocked call may have been routed to overflow tone, a recorded announcement, or the attendant.

e = Not defined. (all zeros)

f = Quantity of Calls Refusing Expensive Routes. This measurement identifies the number of calls which were given ERWT and elected not to use the expensive route (aborted the call or activated Ring Again).

OHQ MEASUREMENTS

g = Quantity of Calls Placed in OHQ. This measurement identifies the number of calls that were placed in the OHQ.

h = Average Time in OHQ. This measurement identifies the average duration that calls waited in the OHQ for a route to become available. The value (in units of 0.1 s.) represents the average time that calls were in the queue. Calls which timed out in the queue before a route was selected are also included in the average.

CBQ MEASUREMENTS

i = Quantity of CBQ Calls. This measurement identifies the number of calls which were offered CBQ and accepted the offer.

j = Average Time in CBQ. This measurement identifies the average time that calls waited in the CBQ for a route to become available. It includes calls which requested a cancellation, calls which were served, and direct Ring Again against trunks. The average time is expressed in units of 0.1 s.

TFN002 NCOS - FORMAT

(system ID) TFN002
 (cust. number)

NCOS	XXX	aaaaa	bbbbbb	cccccc	dddddd	-----	fffff
OHQ	ggggg	hhhhh					
CBQ	iiii	jjjj					

FIELD DESCRIPTIONS

a = total # BARS/NARS/CDP calls attempted by this NCOS
 b = routing requests served w/o delay (no blocking/queuing)
 c = expensive route acceptances (if received ERWT)
 d = # calls blocked (none idle/elig. and failed queuing)
 f = # calls that activated CBQ or abandoned, after ERWT
 g = number of calls placed in OHQ
 h = avg. time in OHQ (total OHQ time/# OHQ calls)
 i = # calls that accepted CBQ offer
 j = avg. time in CBQ (total CBQ time/# CBQ calls) (includes direct trunk access RGA calls)
 XXX = NCOS group

Figure 2

INCOMING TRUNK GROUP MEASUREMENTS (TFN003)

DEFINITION

The Incoming Trunk Group measurements provide an indication of the incremental traffic that was imposed on incoming trunk groups by the network queuing features. Data is provided for each incoming or two-way tie trunk group that is offered OHQ, CCBQ, or CBQCM. These measurements are available at M-1 ESN Nodes (NARS).

TFN003 INCOMING TRUNK GROUP MEASUREMENT FORMAT

For each incoming (or two-way) trunk group the following measurements are accumulated:
(System ID) = unique three-digit number that identifies the switch from which this report was generated.

TFN003 = report number

(Customer ID) = The customer for whom this report was generated.

TRKG XXXX = incoming or two-way trunk route number. (0-30, 32-127, or 0-511 if Rls.14+)

OHQ MEASUREMENTS

a = Quantity of Calls Placed in OHQ. This measurement identifies the number of incoming trunk calls that were placed in the OHQ for possible connection to another trunk group.

b = Average Time in OHQ. This measurement reflects the average time (in units of 0.1 s.) that calls waited in the OHQ for a trunk to become available. The average time also includes those calls that were removed from the OHQ by caller abandonment, or were removed from the queue after expiration of the OHQ time limit.

CBQ MEASUREMENTS

c = Quantity of Incoming Calls Offered CCBQ or CBQCM. This measurement identifies the number of incoming trunk calls for which no outgoing facilities were available at the M-1 ESN Node, and the user was given the option of accepting an M-1 ESN Node-initiated callback when facilities became available. The measurement reflects the use of the CBQ feature by users at an M-1 ESN Main or Conventional Main (Call-Back Queuing to Conventional Main).

d = Quantity of Calls Accepting CCBQ or CBQCM. This measurement identifies the number of incoming trunk calls for which no outgoing facilities were available at the M-1 ESN Node, were offered CBQ, and accepted the offer. The count reflects CBQ acceptances by users at an M-1 ESN Main or Conventional Main.

e = Average Time in CBQ. This measurement (expressed in units of 0.1 s.) reflects the average time that users at an M-1 ESN Main or Conventional Main remained in the CBQ (at the M-1 ESN Node) for a facility to become available.

Note 1: When a CBQ callback is offered to a busy station at an M-1 ESN Main, the call is removed from the queue for five minutes, then reinserted in the queue. This process occurs only once. The additional queuing time is added to the average time, but the call's reinsertion into the queue is not pegged as another CBQ call.

Note 2: When a CBQCM callback is offered to a station at a Conventional Main that is busy or fails to answer the callback, the call is removed from the queue and reinserted into the queue as specified in Note 1.

f = Quantity of Calls Blocked in Callback. This measurement identifies the number of CBQ callbacks (CCBQ or CBQCM) initiated by the M-1 ESN Node that could not be completed because no outgoing tie trunk (to M-1 ESN Main or Conventional Main) was available.

Note: If no tie trunk to the main is available, the outgoing trunk at the node is dropped, and the user remains in queue until such time as both a TIE trunk from the node to the main and outgoing trunk from the node are available.

g = Callback Attempts No Answer and Cancellation. This measurement identifies the number of callback attempts that were not successful because the caller failed to answer the callback. CBQ callbacks to a station at an M-1 ESN Main that has previously cancelled CBQ are treated as callback attempts no answer.

TFN003 INCOMING TRUNK GROUP - FORMAT

(system ID) TFN003
(cust. number)

TRKG XXX

OHQ aaaaa bbbbb

CBQ ccccc dddddd eeeee fffff ggggg

FIELD DESCRIPTIONS

a = # calls from this trk group placed in OHQ

b = avg. time in OHQ (total OHQ time/# OHQ calls)

c = # calls from this trk group offered CCBQ/CBQCM

d = # calls from this trk group that accepted CCBQ/CBQCM

e = avg. time in CBQ (total CBQ time/# CBQ calls)

(this does not include time spent in 5 min.

hold queue for callbacks to busy 500/2500

type sets)

f = # CCBQ/CBQCM callbacks blocked because no TIE trk available back to MAIN. This can only peg once per CCBQ/CBQCM, since another attempt is not made until a trk is available.

g = # callbacks not answered (cancellation at ESN MAIN pegs this field, since no indication of cancellation is given to NODE).

XXX = Incoming trunk route number

Figure 3

OHQ THRESHOLD VIOLATION MEASUREMENT (TFN101)

DEFINITION

The OHQ overflow threshold measurement (TFN101) provides an indication that more than an acceptable number of users are timing out in the OHQ. This means that OHQ is offered and accepted, but a trunk does not become available before the service-changeable OHQ time limit expires. This could result from trunks being out of service, an incorrectly defined OHQ time limit, or temporary traffic overload.

TFN101 OHQ THRESHOLD VIOLATION MEASUREMENT FORMAT

During each traffic reporting period, if the OHQ Threshold is exceeded, the TFN101 will be output in the following format: (System ID)= unique three-digit number that identifies the switch from which this report was generated.

TFN101 = report number

(Customer ID)= The customer for whom this report was generated.

a = **The threshold.** This value (expressed in units of 0.1 percent) represents the acceptable percentage of OHQ users who will timeout in the OHQ before a trunk becomes idle in the ISET.

b = The percentage of OHQ calls which timed out in the OHQ before an available trunk was found. This value (expressed in units of 0.1 percent) represents the total number OHQ overflows, divided by the total number of OHQ offers.

**TFN101 - OHQ THRESHOLD
VIOLATION MEASUREMENT FORMAT**

TFN101 - OHQ THRESHOLD VIOLATION MEASUREMENT FORMAT

```
-----
      (system ID)           TFN101
      (cust. number)

      OHQT                  aaaaaa bbbbbb
-----
```

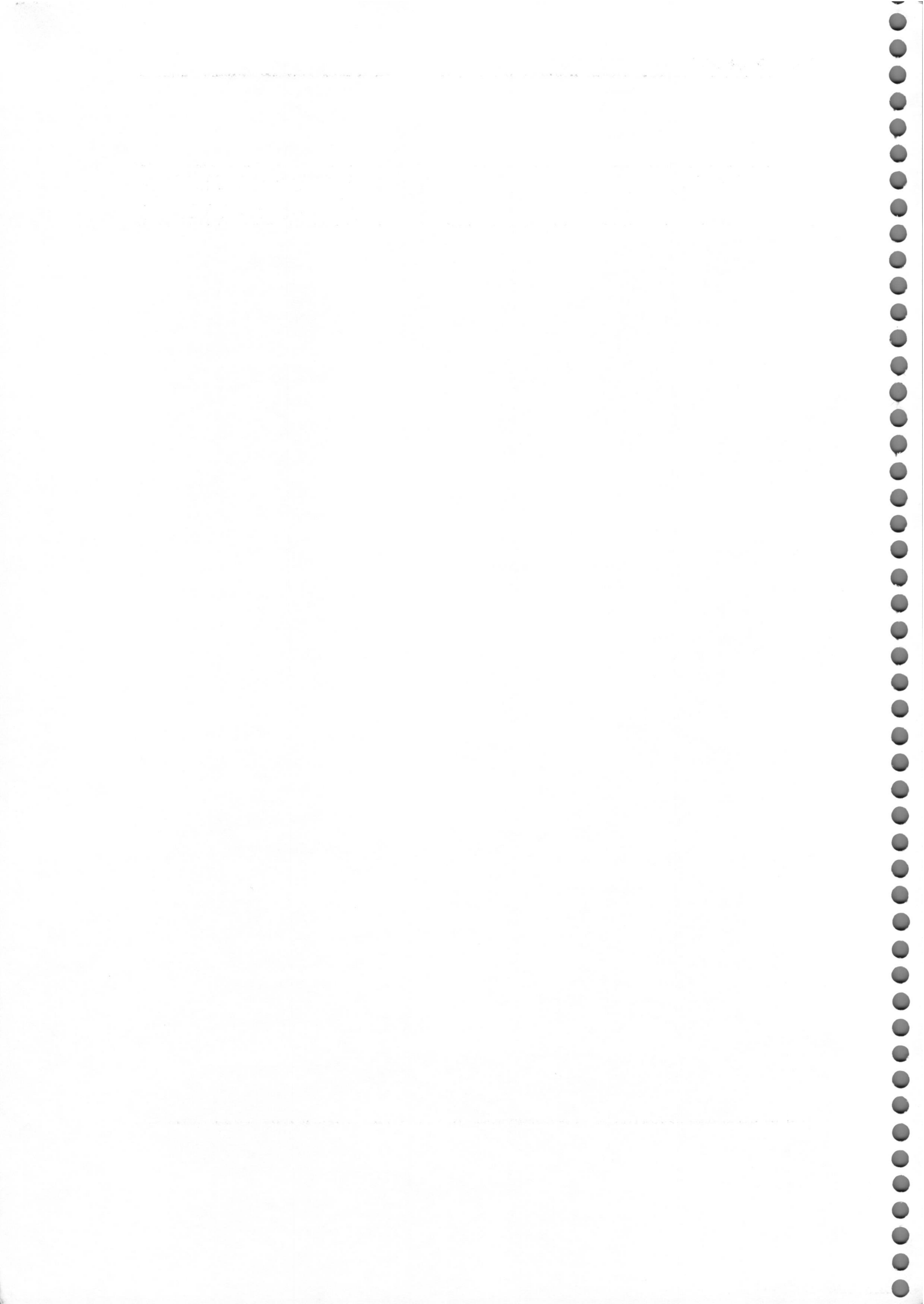
aaaaaa = the present threshold setting
(percentage)

bbbbbb = the percentage of OHQ users
who overflowed (timed out)

122008
120188

Figure 4





MODULE 30

**IMPLEMENTING A
NEW NARS DATABASE**

MODULE 30

OBJECTIVES

This module provides an opportunity to practice gathering customer information with which to build a NARS database. Also provided are guidelines for completing data sheets and the correct Meridian 1 data entry order. Use the section **Recording Information on Worksheets** for an Existing Customer to get started.

Given the Student Workbook and class notes the student should be able to:

- Complete information necessary to provision a NARS database.
- List the steps for filling out worksheets for an existing customer and new customer.
- List the M1 overlay entry order for an existing customer and new customer.

BUILDING AN ESN NETWORK EXERCISE

The exercise on the following pages will provide students with an opportunity to practice creating a NARS database.

The structure of the exercise is informal. Students are directed to ask specific questions regarding each topic of discussion.

The instructor will direct the class to split off into teams; **or** the instructor may direct the entire class to function as database administrators while the instructor functions as the customer.

FINAL WORK EXERCISE INFORMATION

1. Network Access 8
2. Local Access 9
3. NPAs allowed:
 - 918 - Tulsa, OK
 - 713 - Houston, TX
 - 512 - San Antonio, TX
 - 214 - Dallas, TX
 - 817 - Ft. Worth, TX
 - 913 - Kansas
 - 501 - Arkansas
 - 405 - Oklahoma City, OK
4. Home NPA is 214
5. Home Location Code is 550
6. Customer is in a 1+ dialing area
7. SPNs allowed:
 - 1800, 0, 10288, 911, 01, 00, 10222, 1411, 011, 10333
8. Provide CDP at five switches in the 214 area code. CDP calls between the five switches should not have access to the OCC or the COT. Only Tie lines will be used for CDP between the five Dallas switches.
9. Allow Location Codes from Dallas to Houston, San Antonio, and Tulsa over any route. Allow Location code calls to Dallas mains over Tie and COT only.
10. COTs are to be considered expensive and the last choice unless they are the only choice.
11. Restrict use of Houston Tie line from 6PM until 7AM.
12. OCC Coverage:
 - All listed NPAs
 - International
 - Location Codes

- 1214 Toll NXXs
 - No Local 1214 NXXs
 - OCC is to be considered a less expensive route than a COT
13. When using the Tie lines to Houston, San Antonio, and Tulsa, ensure that only their local NXXs are allowed.
14. 1+ NPA is required for all Toll Calls.
15. 1+214 must be out pulsed for toll calls within Dallas, regardless of the facility selected.
- Toll NXXs are: 727, 352, 596, 867.
16. Restrict incoming tie callers from placing any calls through the node that would terminate in their own area code.
17. Deny access to 976 in all NPAs.
18. Recognize:
- LDID and LDDD for Node
 - Offnet DDD and DID (except for the mains in the local 214 area code.)
19. NCOS 1:
- Local NXXs
 - Location codes
 - Steering codes (CDP)
 - Toll in 214, but not over COT.
 - Offer CBQ after ISET is searched
 - CBQ on ISET only
 - Starting priority - 3
 - 911
 - 1800
- NCOS 5: All of the above, plus:
- All calls over any entry
 - Offer CBQ after all entries have been searched
 - CBQ on any entry after 30 seconds
 - Starting priority - 3

- Special numbers: 0, 00, 01, 10288, 10233, 10222, 1411
 - Provide expensive route warning tone
20. Routing control from 7pm until 7am, all day Saturday and Sunday.
- NCOS 5 becomes NCOS 1.
21. 6 digit authorization codes, TGAR 1, NCOS 5, CLS CTD, not recorded on CDR, prompted for international calls with standard 10 bursts of dial tone. Secure data password - 1234.

RECORDING INFORMATION ON WORKSHEETS

The recommended order for filling out worksheets for a **NEW** customer is:

- Complete the Customer Data Block, Overlay 15 (excluding NARS information).
- Complete the Route Data Block, Overlay 16 (excluding NARS information).
- Complete the Trunk Data Block, Overlay 14 (excluding NARS information).
- Complete the Attendant Data Block, Overlay 12 (excluding NARS information).
- Complete the Multi-Line Set Data Block, Overlay 11 (excluding NARS information).
- Complete 500/2500 Set Data Block, Overlay 10 (excluding NARS information).
- Complete the DISA Data Block, Overlay 24.
- Determine the Route Lists required.
- Record the responses to the following prompts on the Route List Data Block, Overlay 86: RLI, ENTR, ROUT, EXP, ISET.
- Determine Digit Manipulation tables needed.
- Complete the Digit Manipulation Data Block, Overlay 86.
- Record Digit Manipulation indexes on the Route List Data Block, Overlay 86.
- Determine Time of Day Schedules needed.

- Record Time of Day Schedules on the ESN Data Block, Overlay 86.
- Record Time of Day Schedules number on the Route List Block, Overlay 86.
- Determine Free Calling Area Screening Tables needed.
- Complete the Free Calling Area Screening Tables.
- Record Free Calling Area Indexes on the Route List Data Block, Overlay 87.
- Determine NCOS levels needed.
- Record the responses to the following prompts on the Network Control Data Block, Overlay 87; NCOS, FRL.
- Record FRLs on the Route List Data Block, Overlay 86.
- Assign the attendant's NCOS level in the Customer Data Block, Overlay 15.
- Assign NCOS levels to incoming/both-way tie trunks in the Trunk Data Block, Overlay 14.
- Assign NCOS to sets, Overlay 11 and 10.
- Assign NCOS level in the DISA Data Block, Overlay 24.
- Determine Routing Control requirements.
- Record the responses to: TODS, RTCL, NMAP, and ETOD in the ESN Data Block, Overlay 86.
- Assign a Routing Control key to the console in the Attendant Data Block, Overlay 12.
- Complete the Network Translation Data Blocks, Overlay 90.

- Complete the AUB and AUT Data Blocks, Overlay 88.
- Assign minimum FRL required for access (without Authcodes) to each route list, Overlay 86, MFRL.
- Determine Network Signaling required on each trunk route.
- Record the response to the SIGO prompt in the Route Data Block, Overlay 16.
- Determine Queuing needed.
- Complete the Network Control Data Block, Overlay 87.
- Complete the Route List Data Block, Overlay 86.
- Assign Ring Again to sets eligible for CBQ, Overlays 10 and 11.
- Allow incoming tie calls to access Queuing in the Route Data Block, Overlay 16.
- Assign Off-hook Queue Threshold to outgoing Routes in the Route Data Block, Overlay 16.
- Determine Incoming Trunk Group Exclusion Indexes required.
- Complete the ITGE Data Block, Overlay 86.
- Complete the ESN Data Block, Overlay 86.
- Determine satellite trunk routes.
- Record the response to the SAT prompt in the Route Data Block, Overlay 16.

RECORDED INFORMATION ON WORKSHEETS

The recommended order for filling out NARS worksheets for an **EXISTING** customer is:

- Determine the Route Lists required.
- Record the responses to the following prompts on the Route List Data Block, Overlay 86: RLI, ENTR, ROUT, EXP, ISET.
- Determine Digit Manipulation tables needed.
- Complete Digit Manipulation Data Block, Overlay 86.
- Record Digit Manipulation indexes on the Route List Data Block, Overlay 86.
- Determine Time of Day Schedules needed.
- Record Time of Day Schedules on the ESN Data Block, Overlay 86.
- Record Time of Day Schedule numbers on the Route List Block, Overlay 86.
- Determine Free Calling Area Screening Tables needed.
- Complete the Free Calling Area Screening Tables, overlay 87.
- Record Free Calling Area Indexes on the Route List Data Block, Overlay 86.
- Determine NCOS levels needed.
- Record the responses to the following prompts on the Network Control Data Block, Overlay 87: NCOS, FRL.
- Record FRLs on the Route List Data Block, Overlay 86.
- Assign the attendant's NCOS level in the Customer Data Block, Overlay 15.

- Assign NCOS levels to incoming/both-way tie trunks in the Trunk Data Block, Overlay 14.
- Assign NCOS levels to sets, Overlays 10 and 11.
- Assign NCOS levels in the DISA Data Block, Overlay 24.
- Determine Routing Control requirements.
- Record the responses to: TODS, RTCL, NMAP, and ETOD in the ESN Data Block, Overlay 86.
- Assign a Routing Control key to the console in the Attendant Data Block, Overlay 12.
- Complete the Network Translation Data Blocks, Overlay 90.
- Complete the AUB and AUT Data Blocks, Overlay 88.
- Assign minimum FRL required for access (without Authcodes) to each route list, Overlay 86, MFRL.
- Determine Network Signaling required on each trunk route.
- Record the response to the SIGO prompt on the Route Data Block, Overlay 16.
- Determine Queuing needed.
- Complete the Network Control Data Block, Overlay 87.
- Complete the Route List Data Block, Overlay 86.
- Assign Ring Again to sets eligible for CBQ, Overlays 10 and 11.
- Allow incoming tie calls to access Queuing in the Route Data Block, Overlay 16.

- Assign Off-hook Queue Threshold to outgoing Routes in the Route Data Block, Overlay 16.
- Determine the Incoming Trunk Group Exclusion Indexes required.
- Complete the ITGE Data Block, Overlay 86.
- Complete the ESN Data Block, Overlay 86.
- Determine satellite trunk routes.
- Record the response to the SAT prompt on the Route Data Block, Overlay 16.

MERIDIAN M-1 DATA ENTRY ORDER

When programming NARS for a **NEW** customer, information is entered into the network in the following order:

- CFN Data Block, Overlay 17.
- CDB Data Block, Overlay 15.
- RDB Data Block, Overlay 16.
- TRK Data Block, Overlay 14.
- ATT Data Block, Overlay 12.
- ESN Data Block, Overlay 86.
- DGT Data Block, Overlay 86.
- FCAS Data Block, Overlay 87.
- NCTL Data Block, Overlay 87.
- RLB Data Block, Overlay 86.
- ITGE Data Block, Overlay 86.
- CDP Data Block, Overlay 87.
- NET Data Block, Overlay 90.
- 500 Set Data Block, Overlay 10.
- M-1 Set Data Block, Overlay 11.
- AUB Data Block, Overlay 88.
- AUT Data Block, Overlay 88.
- DISA Data Block, Overlay 24.

Information on overlay forms and worksheets is entered in the following order for an **EXISTING** customer.

- ESN Data Block, Overlay 86.
- DGT Data Block, Overlay 86.
- FCAS Data Block, Overlay 87.
- NCTL Data Block, Overlay 87.
- RLB Data Block, Overlay 86.
- ITGE Data Block, Overlay 86.
- NET Data Block, Overlay 90.
- CDP Data Block, Overlay 87
- CFN Data Block, Overlay 17.
- CDB, Overlay 15.
- RDB, Overlay 16.
- Trunk Data Block, Overlay 14.
- 500/2500 Data Block, Overlay 10.
- M-1 Set Data Block, Overlay 11.
- DISA Data Block, Overlay 24.
- Attendant Data Block, Overlay 12.
- AUB/AUT Data Blocks, Overlay 88.

